Telonic 3305

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INSTRUMENT SHOP

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3243

OPERATION
AND
SERVICE MANUAL

MODEL 3305
SWEEP OSCILLATOR
PLUG-IN UNIT

INSTRUMENT SHOP

Telonic® INSTRUMENTS
Division of Telonic Industries, Inc.

ID. NO.
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- RETURN TO -
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OPERATION
AND
SERVICE MANUAL
T.O.S. NO. 152B
S/N 22918

MODEL 3305
SWEEP OSCILLATOR
PLUG-IN UNIT

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Serial No. 22418

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1.421 = 2.45 mW

SECTION I

GENERAL INFORMATION

1-1. SPECIFICATIONS.

1-2. Table 1-1. lists the specifications for the 3305 SWEEP OSCILLATOR PLUG-IN UNIT.

TABLE 1-1.

Specifications	
Frequency Range-	5-1500 MHz
Sweep Range-	5-1500 MHz
Sweep Width	
f_1/f_2-	500 kHz to 1500 MHz (Blanked and Unblanked)
$f_c/\Delta f$-	200 kHz to 150 MHz below 1000 MHz (Blanked) 500 kHz to 150 MHz above 1000 MHz (Blanked) 200 kHz to 150 MHz all frequencies (Unblanked)
Fine Frequency Adjustment-	approximately 1% of sweep width capability
*Output Voltage-	0.35 vrms (2.45mW)
Vernier Level Control-	3 dB minimum
**Amplitude Level Variation	
Over Entire Range-	±0.75 dB
Over Any 500 MHz Range-	±0.5 dB
Linearity-	1.2:1 (over full sweep range)
Spurious Content	
Nonharmonic Related-	-20 dB minimum (less than output)
Harmonic Related-	-15 dB minimum (less than output)
Frequency Change Over Entire Leveling Range	
Typical-	100 kHz
Below 1000 MHz	1 MHz maximum
Above 1000 MHz	2 MHz maximum
Frequency Stability	
Drift (1 minute)-	less than 100 kHz
Residual FM-	less than 50 kHz

*When other than the 3343 RF OUTPUT/ATTENUATOR PLUG-IN UNIT is used, subtract the insertion loss.

**Due to the unique electronic band-switching employed in the 3305 SWEEP OSCILLATOR, the approximate 500 and 1000 MHz crossover points can be readily identified by extremely narrow positive and/or negative going spikes on the display trace.

1-3. DESCRIPTION. (Refer to figure 1-1.)

1-4. The 3305 SWEEP OSCILLATOR is a solid state modular unit designed for use with the Telonic 2003 SWEEP/SIGNAL GENERATOR CONTROL CHASSIS. The one heterodyne and two fundamental frequency oscillators of the 3305 provide a swept RF output signal with adjustable sweep widths of 200 kHz to 1500 MHz.

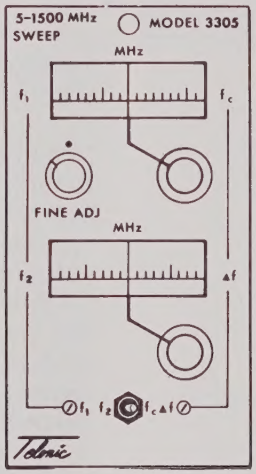

Figure 1-1. 3305 SWEEP OSCILLATOR PLUG-IN UNIT

SECTION II

OPERATING INSTRUCTIONS

2-1. GENERAL.

2-2. This section provides the complete functional control description and operating instructions for the 3305 SWEEP OSCILLATOR PLUG-IN UNIT.

2-3. CONTROL PANEL DESCRIPTION.

2-4. FRONT PANEL. (Refer to figure 2-1.) Table 2-1. provides a complete functional control description of all Front Panel Controls.

TABLE 2-1.

Front Panel Control Functional Descriptions	
f_1/f_2-$f_c/\Delta f$ Mode Switch-	Provides a means of selecting the Start/Stop Mode (f_1/f_2) or the Center/Sweep Width Mode ($f_c/\Delta f$)
f_1-f_c Frequency Selecting Control-	Provides a calibrated control to vary the starting frequency or the center frequency between 5 and 1500 MHz (depending upon position of Mode Switch)
f_2-Δf Frequency Selecting Control-	Provides a calibrated control to vary the stop frequency from 5 to 1500 MHz or the sweep width from 500 kHz to 150 MHz (depending upon position of Mode Switch)
FINE ADJ-	Provides an uncalibrated control to vary the center frequency in the Center/Sweep Width Mode by approximately 1% of full sweep capability
Maximum Level Adjust-	Provides a screwdriver adjustment to set the maximum desired output voltage
Minimum Level Adjust-	Provides a screwdriver adjustment to set the output at least 3 dB below the Maximum Level Adjustment

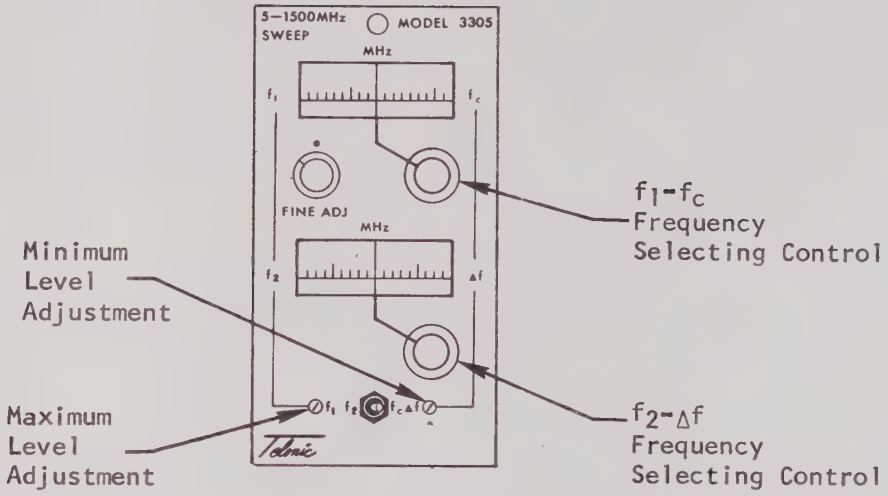

Figure 2-1. Front Panel Controls

2-5. REAR PANEL. (Refer to figure 2-2.) Table 2-2. provides a complete functional description of all Rear Panel Connectors.

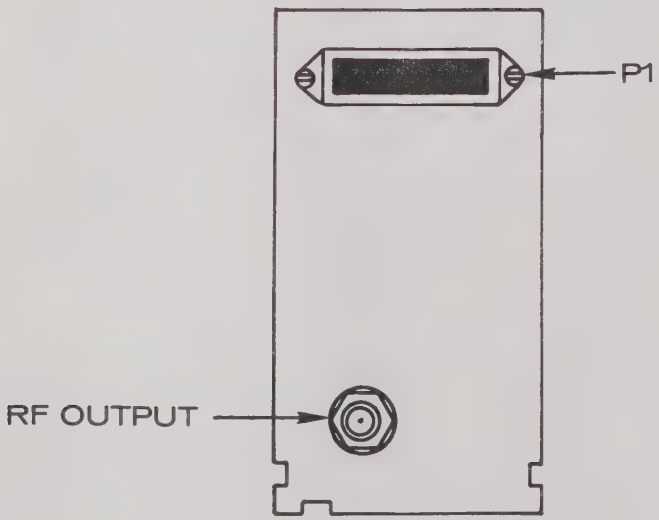

Figure 2-2. Rear Panel Connectors

TABLE 2-2.

Rear Panel Connector Functional Descriptions	
P1-	Provides electrical connection to 2003 Control Chassis
RF Output-	Provides RF Output connection to AREA IV of the 2003

2-6. PRE-OPERATION.

2-7. The following pre-operation procedure must be performed before operating the 3305 SWEEP OSCILLATOR PLUG-IN UNIT.

CAUTION

Ensure the 2003 POWER ON-OFF switch is in the OFF position before proceeding.

a. Insert the 3305 into the 2003 SWEEP/SIGNAL GENERATOR CONTROL CHASSIS AREA I (refer to figure 2-3.) and tighten the 3305 front panel knurled fastening knob.

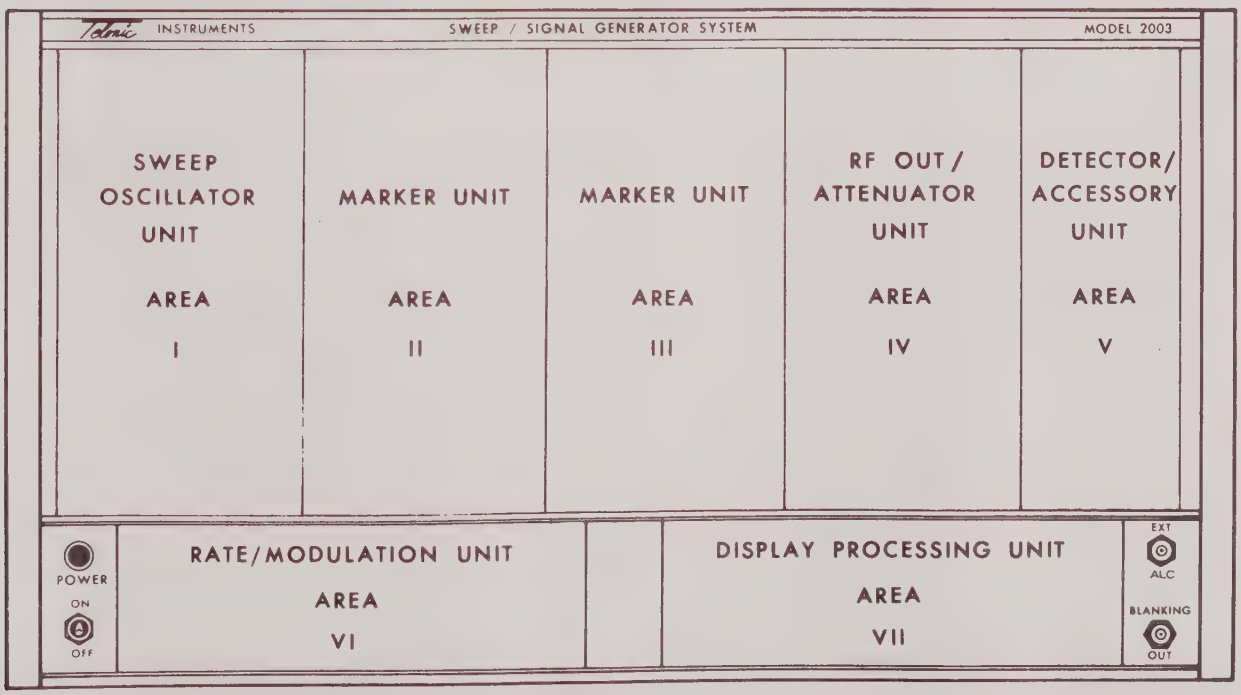

Figure 2-3. 2003 Plug-in Locations

b. Connect the 2003 to the unit under test as shown in figure 2-4.

2-8. OPERATING PROCEDURE.

a. Refer to the 2003 SWEEP/SIGNAL GENERATOR CONTROL CHASSIS OPERATION AND SERVICE MANUAL for 2003 operation.

b. Set the f_1/f_2-$f_c/\Delta f$ Mode Switch to the desired position.

c. Adjust the f_1-f_c and f_2-Δf controls to the desired frequencies.

d. FINE ADJ control will now allow a small variation in the center frequency ($f_c/\Delta f$ mode).

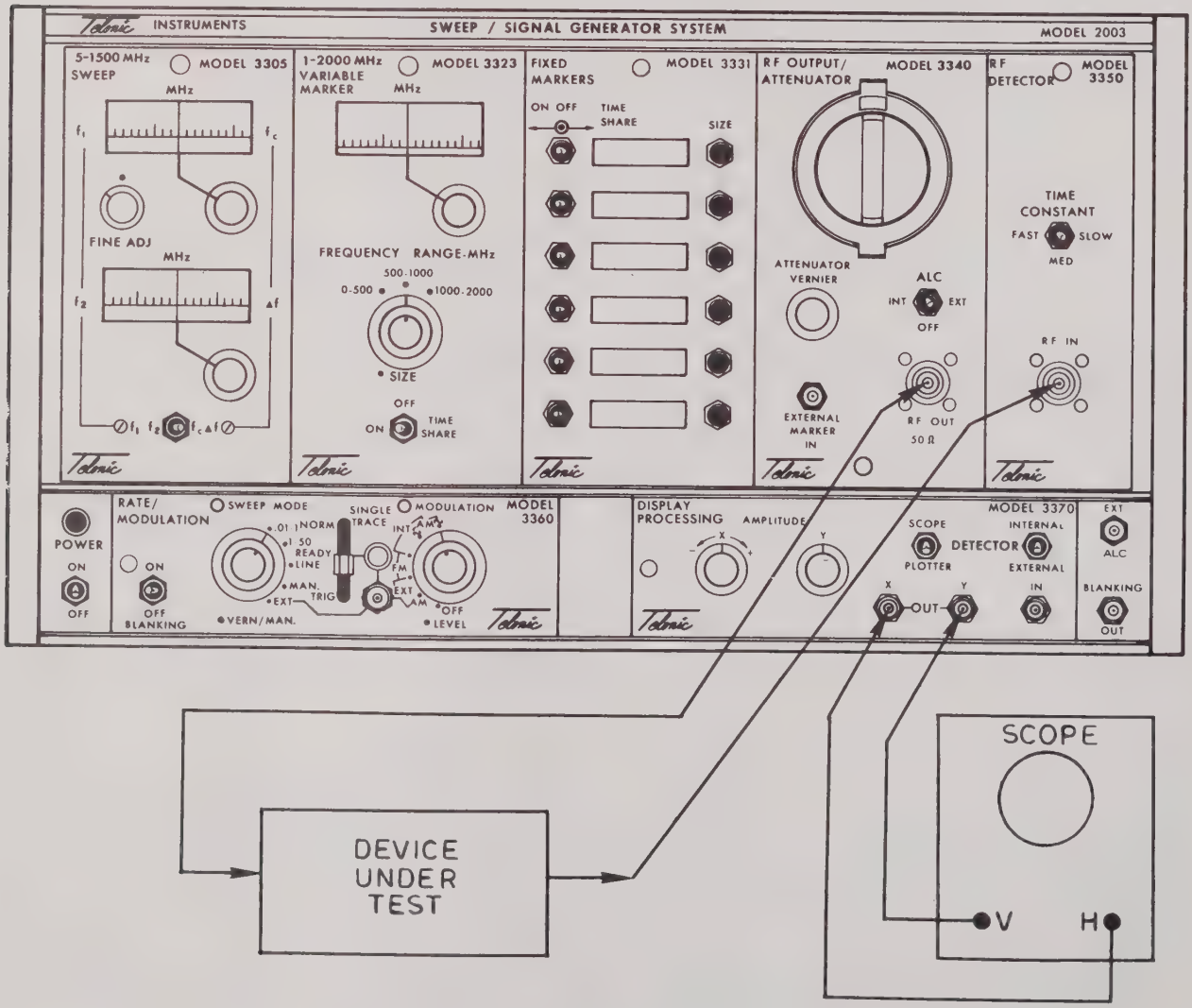

Figure 2-4. Typical Test Connections

SECTION III

PRINCIPLES OF OPERATION

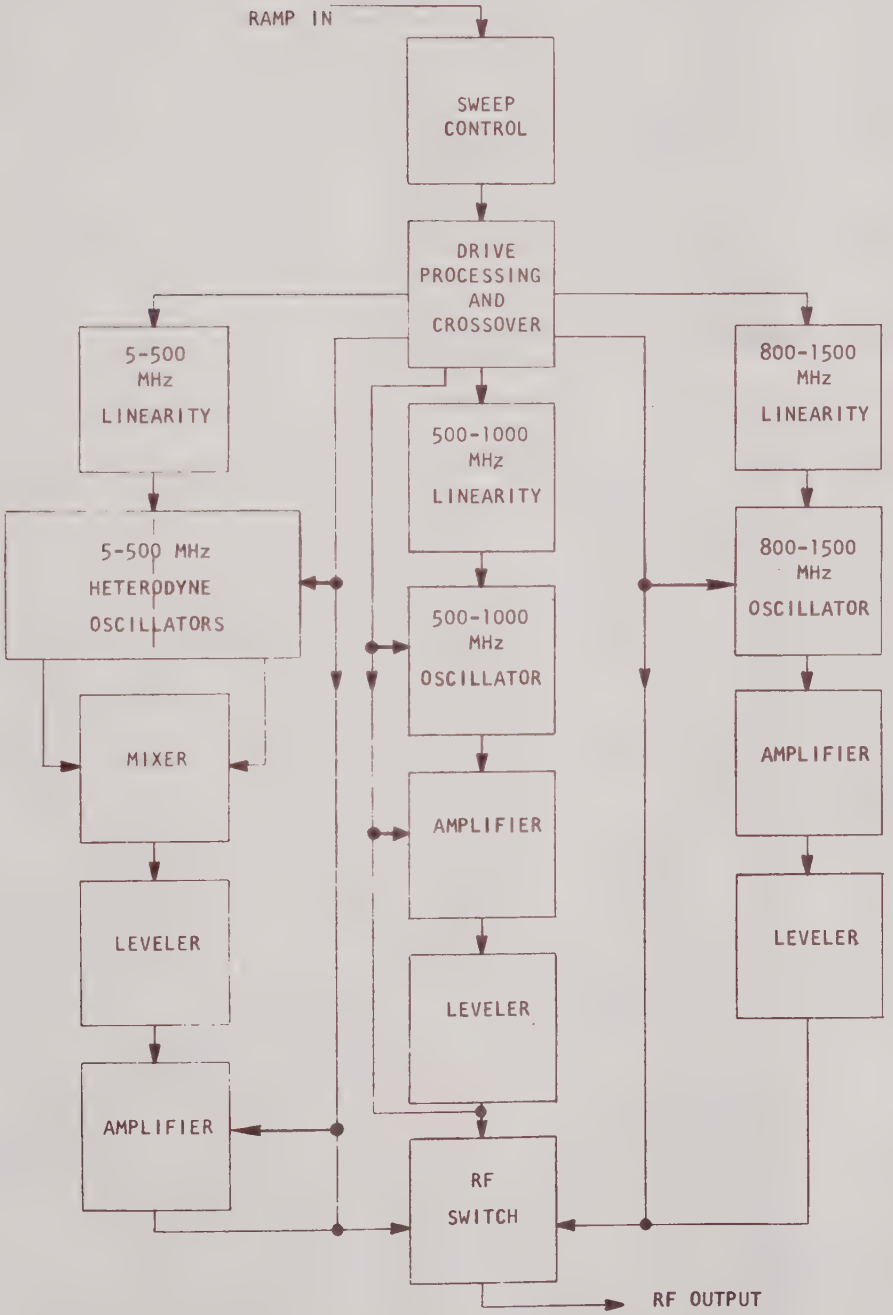

Figure 3-1. 3305 Block Diagram

3-1. GENERAL.

3-2. This section provides a brief description of the electrical circuits of the 3305 SWEEP OSCILLATOR PLUG-IN UNIT.

NOTE

Refer to appropriate schematic diagrams, located in Section V, when reading principles of operation.

3-3. Figure 3-1. provides a complete circuit Block Diagram of the 3305 SWEEP OSCILLATOR PLUG-IN UNIT.

3-4. Power supply voltages and control signals are supplied to the 3305 by the 2003 SWEEP/SIGNAL GENERATOR CONTROL CHASSIS.

3-5. SWEEP CONTROL CIRCUIT-START/STOP MODE. (Refer to figure 3-2.)

3-6. A positive 24 volts, from the 2003 Power Supply, is coupled through pin 8 of the Sweep Control card to + reference amplifier transistor Q1. The +10 VDC output of Q1, adjusted by biasing resistor R5, is coupled out thru pin 9 to the front panel f_1-f_c Control where a portion of a ramp input signal is combined with a portion of this +10 VDC and the resultant, + ramp signal, is fed back into the Sweep Control circuitry thru pin F and resistor R6 to the base of + ramp amplifier transistor Q2. The amplified output signal of Q2 is directly coupled to the base of transistor Q3; half of the adder circuit amplifier.

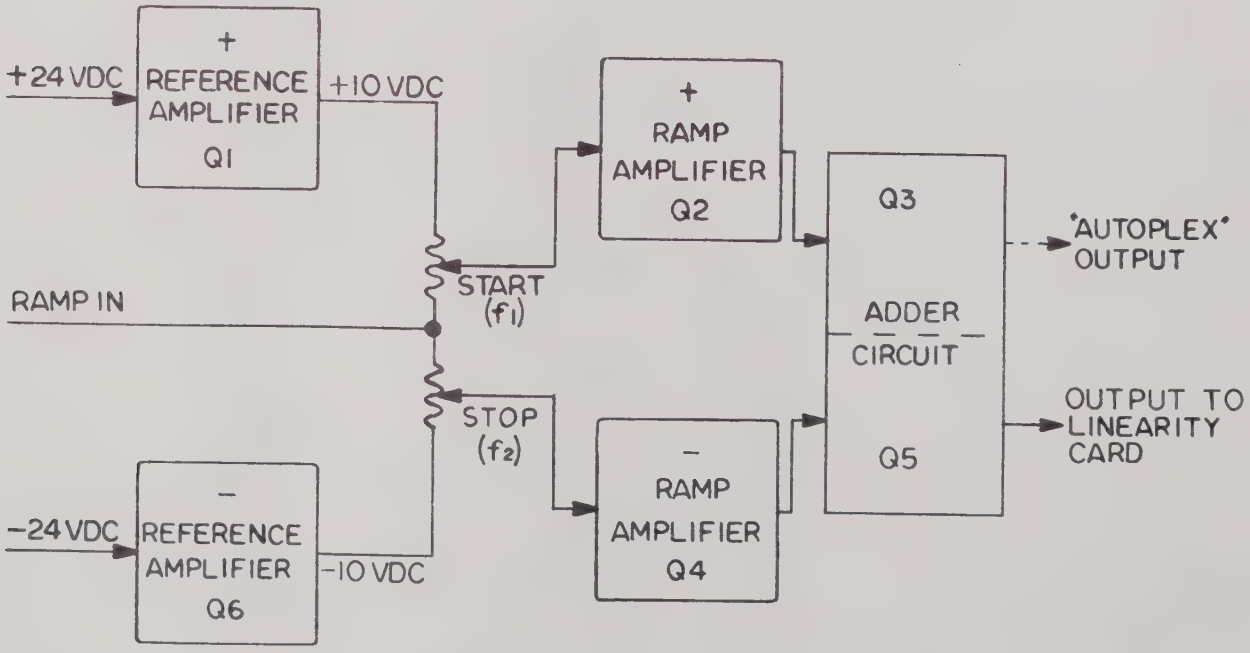

Figure 3-2. Sweep Control Start/Stop Mode Block Diagram

3-7. A negative 24 volts, from the 2003 Power Supply, is coupled thru pin 3 of the Sweep Control card to - reference amplifier transistor Q6. The -10 VDC output of Q6, adjusted by biasing resistor R22, is coupled out thru pin B to the front panel f_2-Δf Control where a portion of a ramp input signal is combined with a portion of this -10 VDC and the resultant - ramp signal, is fed back into the Sweep Control circuitry thru pin J and resistor R18 to the base of - ramp amplifier transistor Q4. The amplified output signal of Q4 is directly coupled to the base of transistor Q5; the other half of the adder circuit amplifier.

3-8. The adder circuit combines the two input signals algebrically, the output signal, from the collector of transistor Q5, is coupled out thru pin 7 and the output of transistor Q3 is coupled out thru pin 4. These two output voltages, at different DC levels, are fed to the Drive Processing and Crossover circuit.

3-9. SWEEP CONTROL CIRCUIT-CENTER/SWEEP WIDTH MODE. (Refer to figure 3-3.)

3-10. A positive 24 volts from the 2003 Power Supply is coupled thru pin 8 of the Sweep Control card to + reference amplifier transistor Q1. The +10 VDC output of Q1, adjusted by biasing resistor R5, is coupled out thru pin 9 to one end of the front panel f_1-f_c Control.

3-11. A negative 24 volts from the 2003 Power Supply is coupled thru pin 3 of the Sweep Control card to - reference amplifier transistor Q6. The -10 VDC output of Q6, adjusted by biasing resistor R22, is coupled out thru pin B to the other end of the front panel f_1-f_c Control.

3-12. The resultant DC output of this control, from +10 VDC to -10 VDC is fed back into the Sweep Control circuitry thru pin F and resistor R6 to the base of + ramp amplifier transistor Q2. The amplified output voltage of Q2 is directly coupled to the base of transistor 03; half of the adder circuit amplifier.

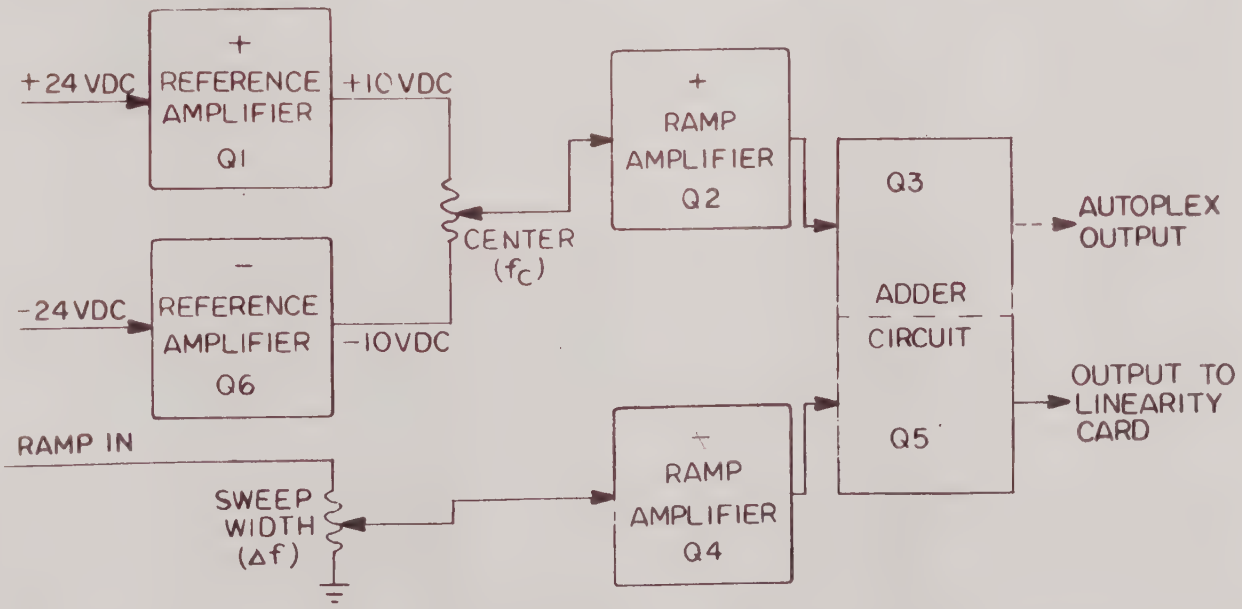

Figure 3-3. Sweep Control Center/Sweep Width Mode Block Diagram

3-13. A portion of the ramp signal is brought in from the f_2-Δf Control thru pin J and resistor R18 to the base of - ramp amplifier transistor Q4. The amplified output signal of Q4 is directly coupled to the base of transistor Q5; the other half of the adder circuit.

3-14. The adder circuit combines the two voltages algebraically. The output signal, from the collector of transistor Q5, is coupled out thru pin 7 and the output from the collector of transistor Q3 is coupled out thru pin 4. These two signals, at different DC levels, are fed to the Drive Processing and Crossover card.

3-15. DRIVE PROCESSING AND CROSSOVER CIRCUIT.

3-16. The basic functions of this unit are to provide sequential *"AUTOPLEX" ramp voltages for the linearity circuits of each oscillator and sequential switching voltages for the individual oscillators and for the RF switching circuit.

3-17. SEQUENTIAL "AUTOPLEX" RAMPS. (Refer to figure 3-4.)

3-18. A ramp input signal is fed thru pin 4 of the drive processing and crossover card to the translator circuit consisting of transistors Q1, Q6, and Q2 and resistors R9, R2, and R1. Transistor Q1 provides an impedance match for the translator.

3-19. The output signal voltage from the emitter of Q1 is coupled thru resistor R4 to the emitter of transistor Q3, which is biased just to the point of saturation by resistors R3 and R10. The input ramp signal causes the conduction of Q3 to fall towards cutoff very quickly, producing at diode CR2, a ramp voltage that makes its complete change in the first 33% of the input ramp; this voltage is coupled out thru pin D of the card to the 5-500 Linearity circuit.

3-20. The same output voltage of Q1 is also coupled thru resistor R6 to the emmiter of transistor Q4, which has been biased well into saturation by resistors R5 and R12. The input signal must overcome this bias before it can affect the conduction of Q4 and produce, at diode CR3, a ramp voltage that makes its complete change during the middle third of the input signal. This delayed ramp is coupled thru pin B of the card to the 500-1000 Linearity circuit.

3-21. A second output signal is taken from the emitter of transistor Q6, coupled directly to the base of amplifier transistor Q7, amplified, and coupled thru resistor R14 to the base of transistor Q5. Transistor Q5 is biased well beyond saturation and requires a very large signal to overcome this bias and affect its conduction. Only in the last one third of the input cycle will enough signal be present to affect the conduction of Q5 and produce an output ramp voltage at diode CR4. This output is coupled thru pin A of the card to the 800-1500 Linearity circuit.

* Telonic Trademark

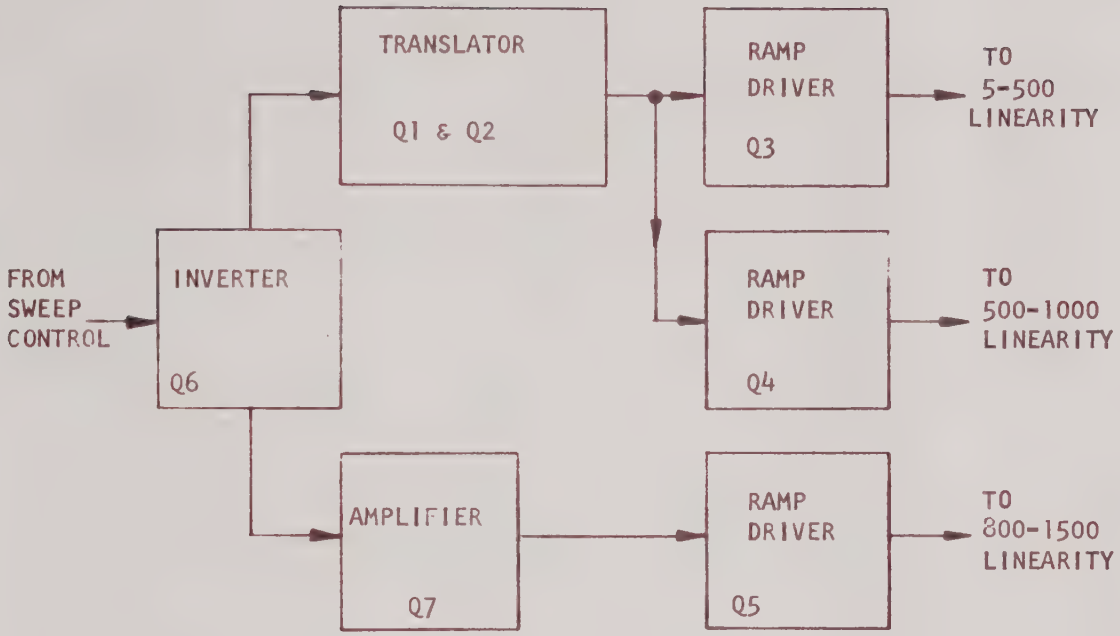

Figure 3-4. Sequential Ramp Circuit Block Diagram

3-22. Figure 3-5. shows time relationship between the input ramp voltage and the three output signals to the linearity circuits.

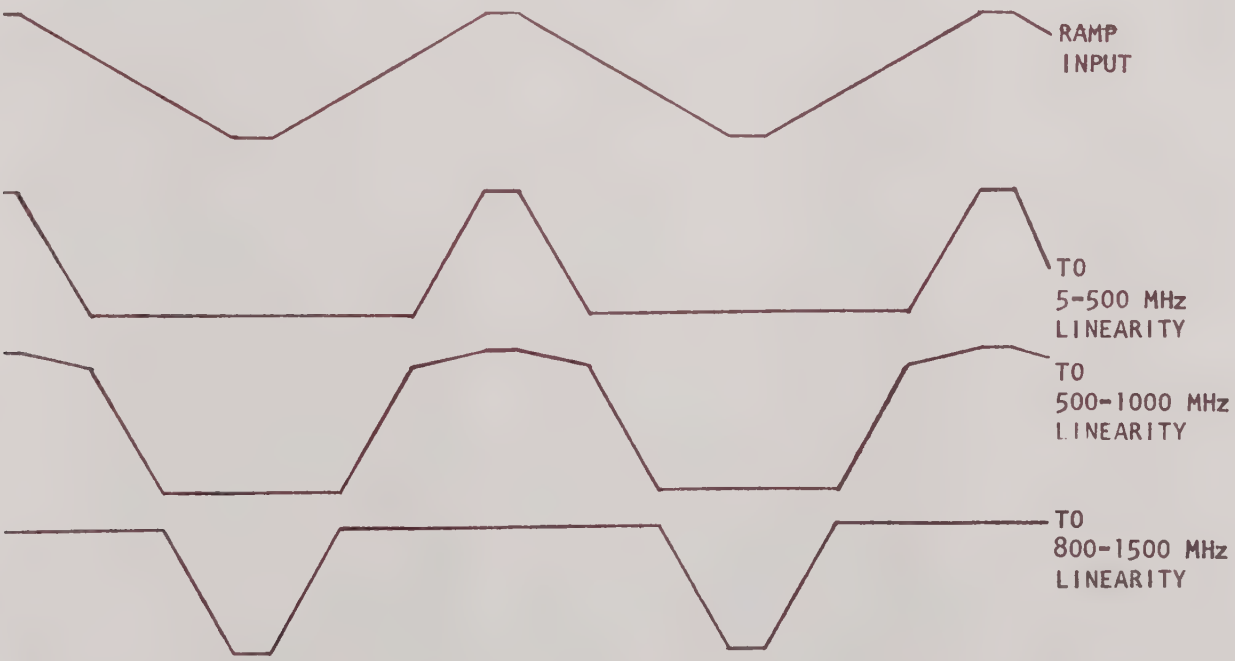

Figure 3-5. Typical Output Waveforms From Sequential Ramp Circuit

3-23. SEQUENTIAL "AUTOPLEX" SWITCHING. (Refer to figure 3-6.)

3-24. A ramp input signal, from the Sweep Control circuit, is fed thru pin 1 of the drive processing and crossover card directly to the translator circuit made up of transistors Q8 and Q11 and resistors R21, R30, and R31. The output signal voltage from Q11, shifted from a positive to a negative DC level, is applied to two voltage divider networks.

3-25. One network, consisting of resistors R32, R27, R28 and R24, supplies the base of transistor Q12; the other network, consisting of resistors R43, R41 and R40, supplies the base of transistor Q15.

3-26. Transistors Q12, Q13, and Q14 makeup a high gain amplifier to drive switching transistor Q19; transistors Q15, Q16 and Q17, another high gain amplifier, drive switching transistor Q20.

3-27. At a certain point on the input ramp voltage, determined by the setting of low crossover resistor R28, transistor Q19 will turn full on and produce a negative output voltage. This negative voltage is coupled out thru diode CR8 to the 500-1000 MHz Oscillator and thru diode CR6 to the base of transistor Q10 to shut off Q10.

3-28. Transistors Q10 and Q9 are drivers for switching transistor Q18. When Q10 is shut off it shuts off Q18 and turns off the negative output thru diode CR7 and pin 10 to the 5-500 MHz Oscillator.

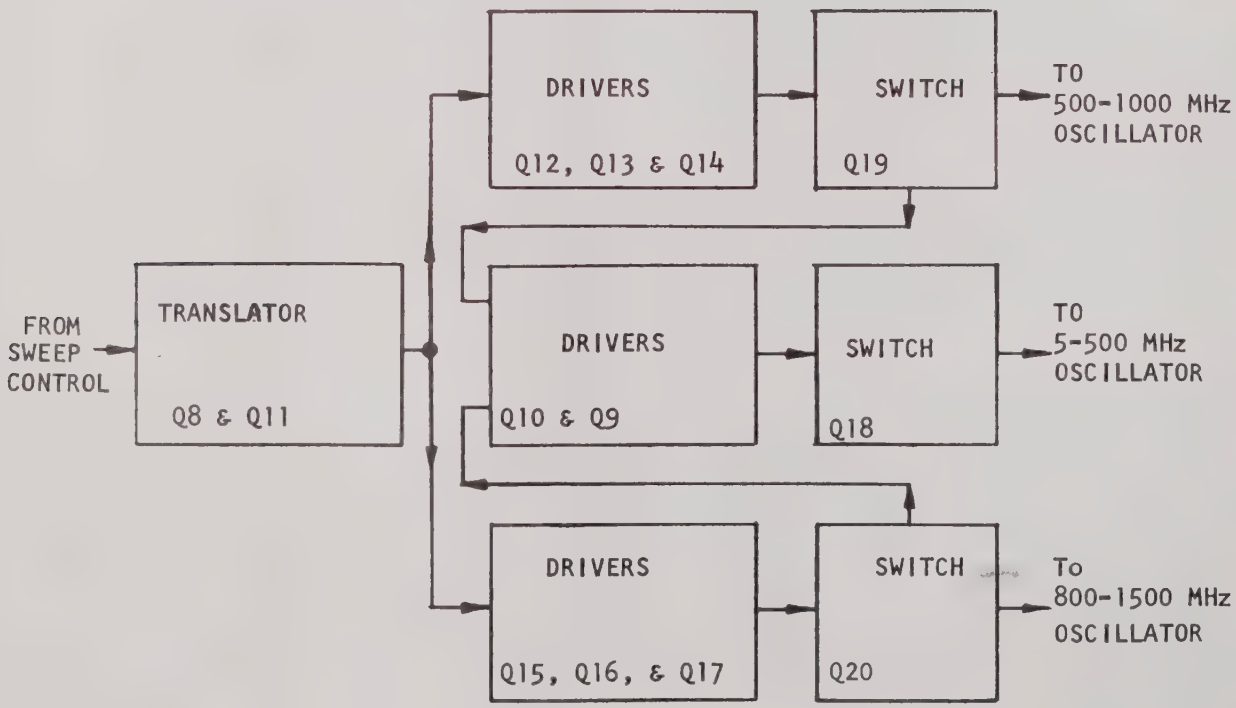

Figure 3-6. Sequential Switching Circuit Block Diagram

3-29. As the input ramp voltage continues to change in amplitude it reaches a point, determined by the setting of high crossover resistor R42, where it will turn on driver transistors Q15, Q16, and Q17. The output from these transistors, in turn, causes transistor Q20 to switch and supply a negative output voltage thru diode CR9 and pin 6 to the 800-1500 MHz oscillator. This same negative voltage is coupled thru resistor R38 to the base of transistor Q13 to turn it off and therefore turn off the negative supply voltage from transistor Q19 to the 500 to 1000 MHz oscillator. This negative output voltage from Q20 is also coupled thru diode CR5 to the base of Q10 to keep it off.

3-30. With no negative output from switching transistors Q19 and Q20, transistor Q10 will conduct and, in association with transistor Q9, will turn switching transistor Q18 on, Q18 produces a negative voltage that is coupled out thru diode CR7 and pin 10 to the 5-500 MHz oscillator.

NOTE

Figure 3-7. shows time relationship between switching voltages, input ramp signal, and the blanking voltage.

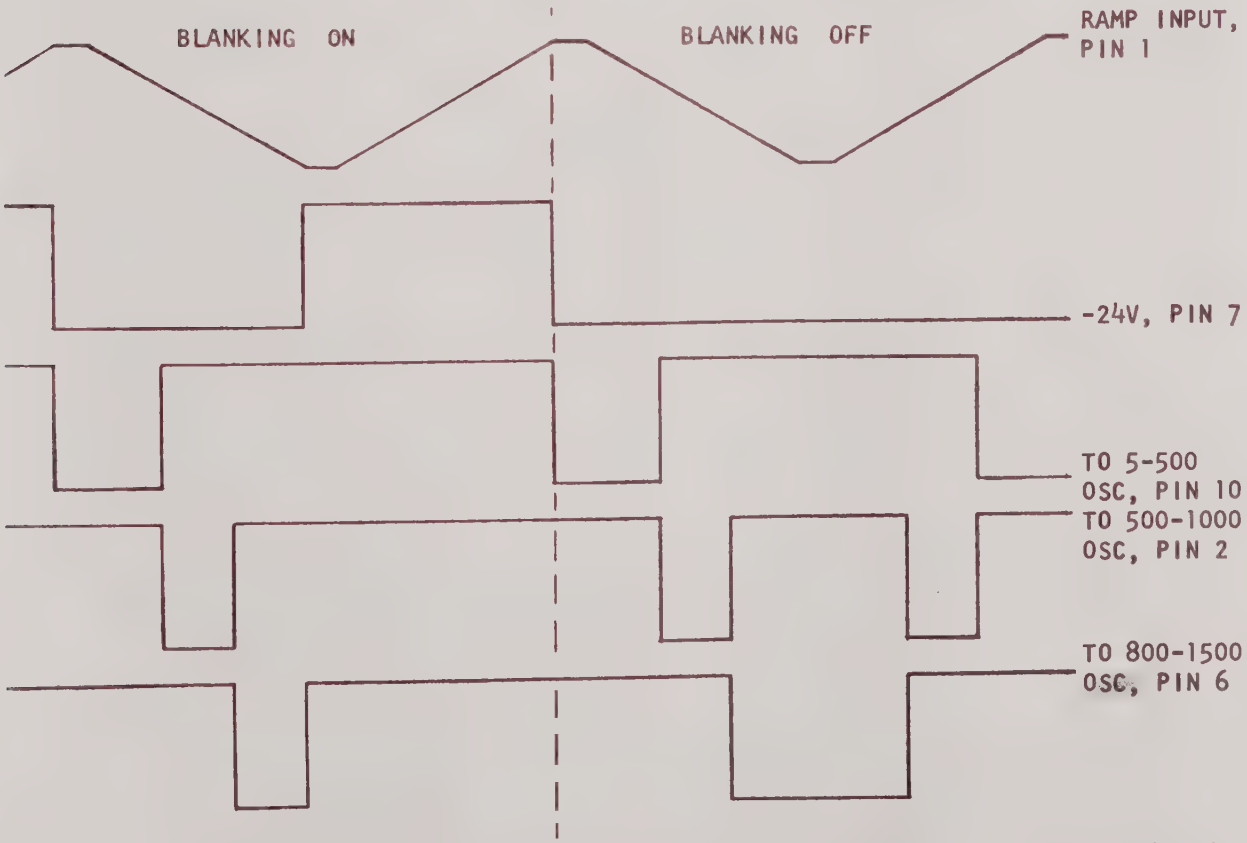

Figure 3-7. Typical Output Waveforms From Sequential Switching Circuit

3-31. 5-500 LINEARITY CARD. (Refer to figure 3-8.)

3-32. The ramp voltage input, from pin 4 of the card plug P1, is connected directly to the base of ramp amplifier transistor Q2. The amplified output is taken from the collector of Q2 to the base of the high oscillator control driver transistor Q1; the driver's output is coupled out to the high oscillator thru pin 6 of connector P1.

3-33. Another output, from the emitter of Q2, is connected directly to the base of the phase inverter transistor Q4. The amplified and inverted output of Q4 is connected to the low oscillator control driver transistor Q3; the driver's output is coupled out to the low oscillator thru pin 7 of P1.

3-34. 5-500 MHz OSCILLATOR MODULE (Refer to figure 3-9.)

3-35. The basic 5-500 oscillator is a heterodyne oscillator employing two modified Clapp circuits. The frequency of the higher oscillator is determined by the resonant line, consisting of inductor L15 and varactor CR4. The frequency of the lower oscillator is determined by the resonant line, consisting of inductor L10 and varactor CR1.

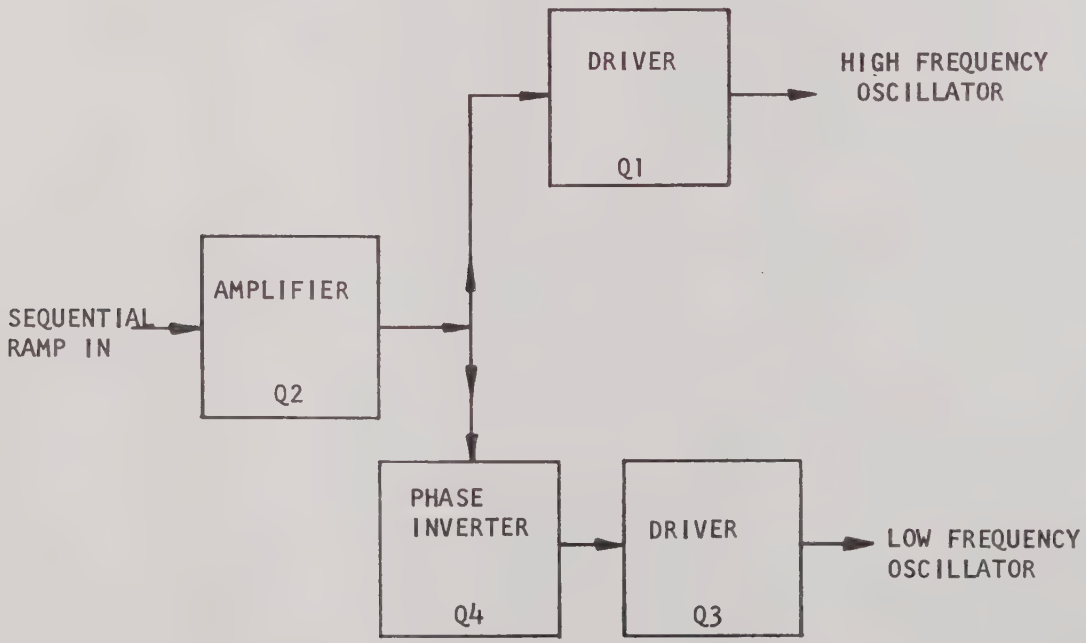

Figure 3-8. 5-500 Linearity Card Block Diagram

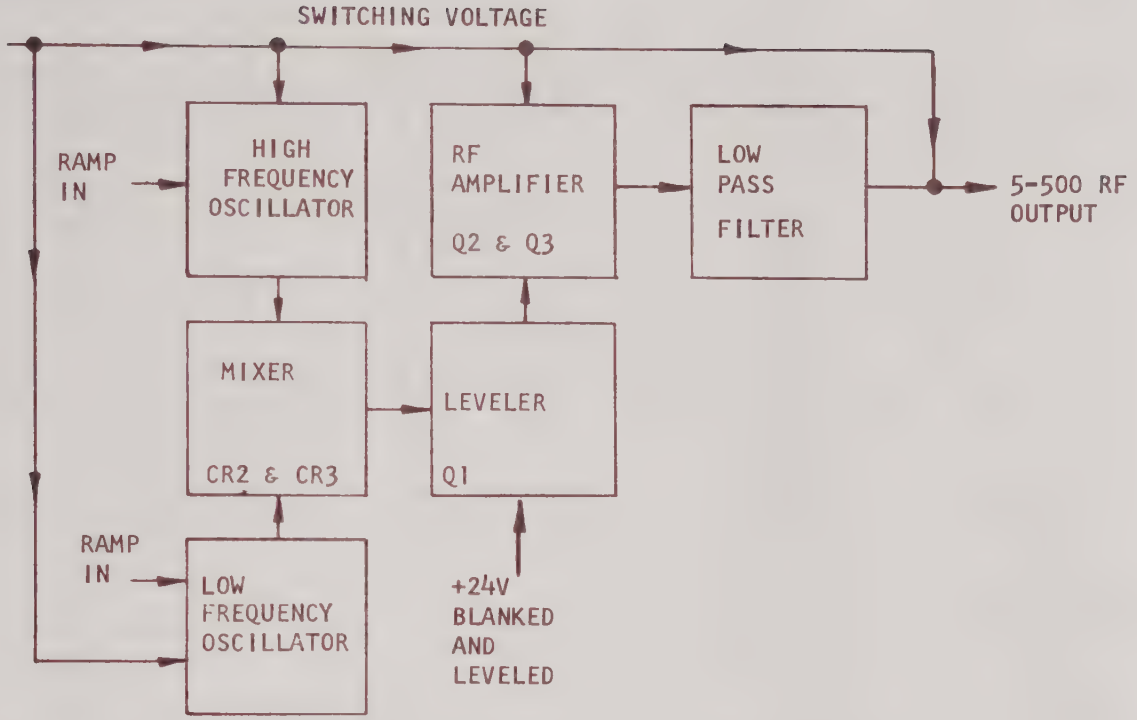

Figure 3-9. 5-500 Oscillator Module Block Diagram

3-36. The high oscillator varactor CR4 is driven by a ramp voltage coupled in thru a decoupling network, capacitors C16 and C28, inductor L19 and inductor L16.

3-37. The low oscillator varactor CR1 is driven by a ramp voltage coupled thru capacitors C19 and C29, inductor L20 and inductor L7.

3-38. Supply voltages for the oscillators are the negative "AUTOPLEX" switching voltages fed thru a decoupling network consisting of capacitor C20, inductor L6, and capacitor C30.

3-39. The oscillator supply lines are isolated by two networks consisting of resistor R17, inductor L9, and capacitor C31 (low oscillator) and resistor R19, capacitor C26, and inductor L18 (high oscillator).

3-40. The RF voltage produced by the low oscillator is transformer coupled to the mixer stage from inductor L10 to inductors L11 and L12. The RF voltage from the high oscillator is transformer coupled to the mixer from inductor L15 to inductor L14.

3-41. The mixer, consisting of inductor L11, resistor R22, diode CR2, capacitor C24, inductor L14, resistor R23, inductor L12 and diode CR3 combines the two oscillator outputs and the resultant, difference frequency, is coupled out thru a low pass filter, consisting of inductor L13 and capacitor C23, to the leveler stage.

3-42. The leveler circuit, consisting of field effect transistor Q1 and associated components, acts as a variable series resistance controlled by the positive 24

volts blanked and leveled coupled in thru capacitor C1, resistor R1, capacitor C27, and resistor R2 to the gate of Q1, and determines the amplitude of the RF voltage fed to the amplifier stage.

3-43. The RF voltage is coupled through capacitor C3 to the amplifier, a cascode circuit consisting of transistors Q2 and Q3 and their associated components where it is amplified and coupled out through resistor R9 to the filter circuit. Supply voltage for the amplifier is coupled thru resistors R5 and R8 from the same source that supplies voltage for the oscillators.

3-44. The RF signal is fed thru the low pass filter consisting of inductor L2, capacitor C7, inductor L3, capacitor C8, inductor L4, capacitor C9, inductor L5, capacitor C10, and coupling capacitor C11 to the output connector J1.

3-45. A negative DC switching voltage is applied thru resistors R10 and R11, bypass capacitor C14, resistor R12, and bypass capacitor C13, to connector J1.

3-46. The resultant voltage, at J1, consists of an RF signal voltage riding on a negative DC switching voltage.

3-47. 500-1000 MHz LINEARITY.

3-48. The ramp voltage is coupled thru pin 2 directly to the base of amplifier transistor Q2. Δf control, resistor R21, determines the amplitude of the ramp signal fed from the collector of Q2 to the emitter of transistor Q1 and the DC level of Q1 is set by the f_c control resistor R17.

3-49. The collector load of Q1, a shaping network, modifies the ramp and is fed out thru pin 4.

3-50. 500-1000 MHz OSCILLATOR (Refer to figure 3-10.)

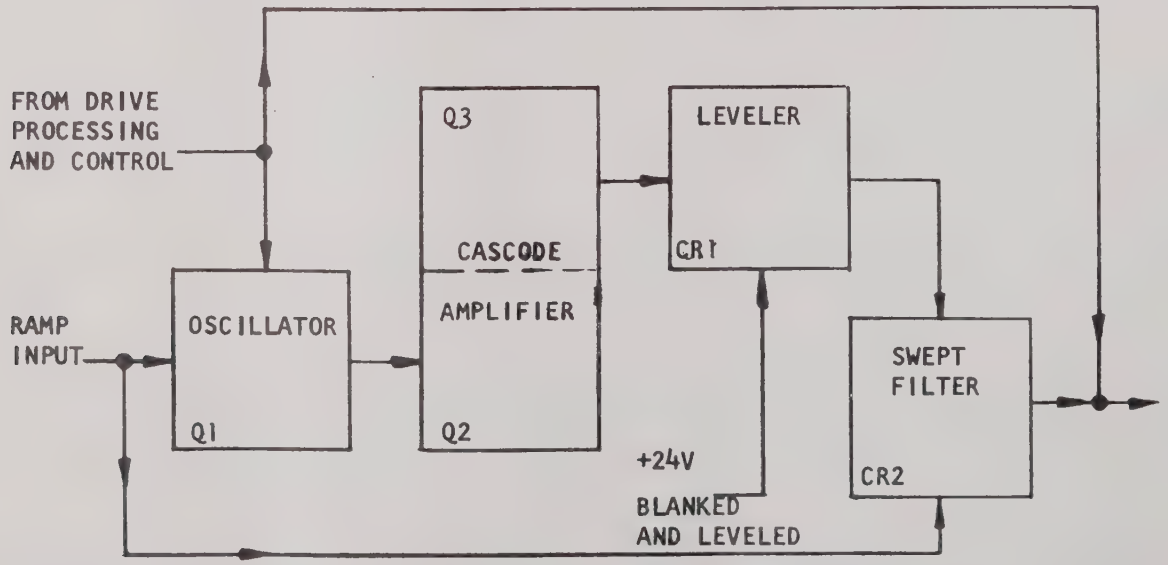

Figure 3-10. 500-1000 MHz Oscillator Block Diagram

3-51. The basic 500-1000 MHz Oscillator is a modified Clapp circuit with feedback to sustain oscillation provided by the internal capacitance of transistor Q1. Output frequency is determined by the series resonant line consisting of varactors CR3 and CR4, and inductors L18 and L16. The varactors are driven by the ramp voltage from the Linearity card, which is fed in thru bypass capacitors C3 and C7, and decoupling inductors L8, L13 and L14.

3-52. Supply voltage for the oscillator is the negative "AUTOPLEX" switching voltage coupled, from the drive processing and crossover circuit, thru a decoupling network consisting of capacitor C4, inductor L9, and capacitor C8. Capacitor C12 provides isolation between transistor Q1 and varactors CR3 and CR4.

3-53. The RF voltage produced by the oscillator is coupled thru capacitor C27 to the base of transistor Q2, half of the cascode amplifier. The amplified RF output voltage from the collector of transistor Q3, the other half of the cascode amplifier, is coupled thru resistor R15 to the leveler diode CR1.

3-54. The resistance of CR1 is varied by the positive voltage applied to it thru a decoupling network consisting of capacitor C1, resistor R1, capacitor C5, resistor R2, and inductor L1.

3-55. The leveled RF signal is applied to a filter network consisting of inductors L2, L3, L4, and L5, and capacitors C10, C13, C15, C17 and C22.

3-56. The filter sweeping network, made up of capacitor C16, inductor L17, and varactor CR2, is connected in parallel with capacitor C15 in the filter network. In order to ensure that the oscillator and filter are sweeping together, the drive voltage for CR2 is coupled, thru isolation resistor R7, from the same source that supplies drive for the oscillator varactors. The output of the filter is coupled out thru capacitor C24 to connector J1.

3-57. The same negative switching voltage that was applied to the oscillator and amplifier circuits is also applied to J1 thru bypass capacitors C2 and C6, inductors L6 and L7, and resistor R14. The output at J1 consists of a periodic swept RF riding at a negative DC level.

3-58. 800-1500 MHz LINEARITY CIRCUIT.

3-59. The ramp input voltage is coupled in, thru pin 2 of the card, directly to the base of amplifier transistor Q2. The Δf control, resistor R32, determines the gain of Q2. The amplified output from the collector of Q2 is applied directly to the emitter of transistor Q1 whose DC level is determined by f_C control, resistor R29. The shaping network of diodes and resistors acts as a load for the collector of Q1 and the amplified and shaped output ramp is coupled out thru pin 4 of the card.

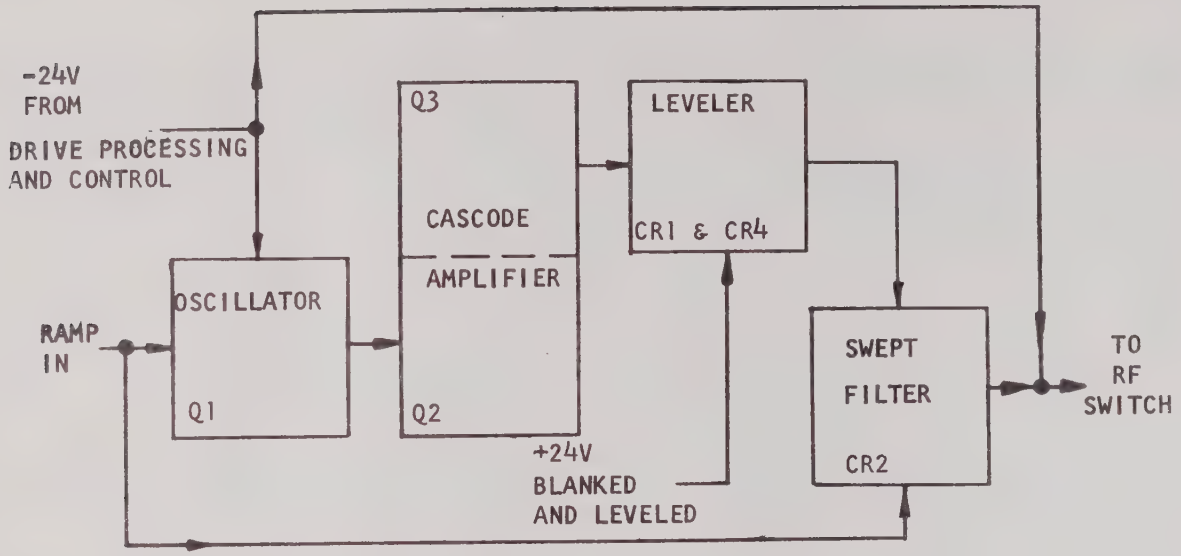

Figure 3-11. 800-1500 MHz Oscillator Block Diagram

3-60. 800-1500 MHz OSCILLATOR (Refer to figure 3-11.)

3-61. The basic 800-1500 MHz oscillator is a modified Clapp circuit whose output frequency is determined by the series resonant line consisting of varactor CR3 and inductors L14 and L17. CR3 is driven by the ramp voltage from the linearity circuit which is fed in thru bypass capacitors C3 and C7, and decoupling inductors L8, L12, and L13.

3-62. Supply voltage for the oscillator is the negative "AUTOPLEX" voltage fed from the Drive Processing and Crossover circuit thru a decoupling network consisting of capacitors C4 and C8, and inductor L9.

3-63. The RF voltage produced by the oscillator is coupled thru capacitor C25 to the base of transistor Q2, half of the cascode amplifier. The amplified RF output voltage from the collector of transistor Q3, the other half of the cascode amplifier, is coupled thru resistor R16 to leveler diodes CR4 and CR1.

3-64. The resistance of CR1 and CR4 is varied by the positive voltage applied to them thru capacitors C1 and C5, resistors R1 and R2, and inductor L1.

3-65. The leveled RF signal is applied to a filter network consisting of inductors L2, L3, and L4, and capacitors C13, C15, C17, and C22.

3-66. The filter sweeping network, consisting of capacitor C16, inductor L11, and varactor CR2 is connected in parallel with capacitor C5. In order to ensure that the oscillator and the filter are sweeping together, the drive voltage for CR2 is coupled, thru isolation resistor R7, from the same source that supplies drive for the oscillator varactor. The output of the filter is coupled out, thru capacitor C23 and inductor L5, to connector J1.

3-67. The same negative switching voltage that was applied to the oscillator circuit is also applied to J1 thru bypass capacitors C2 and C6, inductors L6 and L7, and resistor R14. The output at J1 consists of a periodic swept RF riding at a negative DC level.

3-68. RF SWITCH.

3-69. Outputs from the three oscillator circuits, consisting of RF voltage riding a negative DC switching voltage, are connected into the RF switch thru connectors P1, P2, and P3. The negative switching voltage will forward bias its appropriate switching diode, CR1, CR2, or CR3, causing the diode to have low series resistance and will allow the RF present to pass thru coupling capacitor C3 to output connector P4; figure 3-12 shows a typical group of input signals and the resultant output signal.

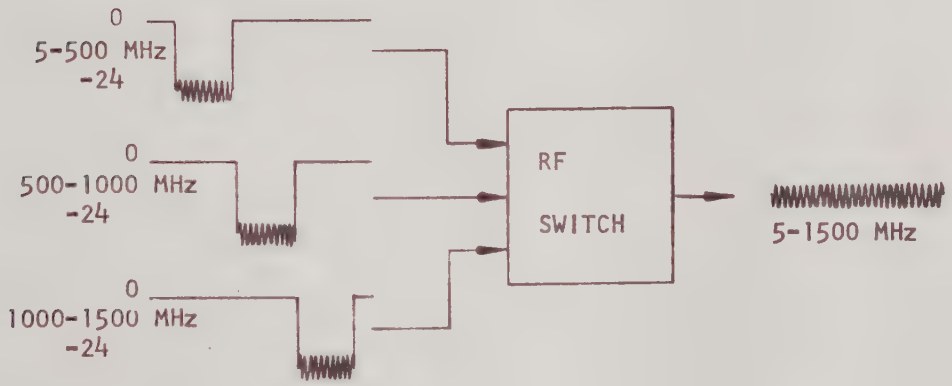

Figure 3-12. RF Switch Signals

SECTION IV

MAINTENANCE

4-1. GENERAL.

4-2. This section provides complete information for troubleshooting and maintenance of the 3305 SWEEP OSCILLATOR PLUG-IN UNIT.

4-3. TEST EQUIPMENT.

4-4. The following test equipment will be required to perform maintenance and alignment of the 3305:

a. Sweep Signal Generator Control Chassis	Telonic 2003 or equivalent
b. Fixed Marker Plug-in Unit	Telonic 3331 or equivalent
c. Variable Marker Plug-in Unit	Telonic 3323 or equivalent
d. RF Output Plug-in Unit	Telonic 3343 or equivalent
e. RF Detector Plug-in Unit	Telonic 3350 or equivalent
f. Rate Modulation Plug-in Unit	Telonic 3360 or equivalent
g. Display Processing Plug-in Unit	Telonic 3370 or equivalent
h. Test Cable Set	Telonic CS-5 or equivalent
i. Attenuator	Telonic TA109E or equivalent
j. Oscilloscope	Tektronix Model 503 or equivalent
k. Power Meter	Hewlett Packard Model 431B or equivalent
l. Differential Voltmeter	Fluke Model 873A or equivalent
m. Tunable Filter Kit	Telonic TTK-4-5 or equivalent
n. Thermistor Mount	Hewlett Packard Model 478A or equivalent

4-5. PERFORMANCE CHECK.

4-6. This performance check may be used as a routine maintenance procedure or as an incoming inspection to verify the performance of the 3305 SWEEP OSCILLATOR.

a. Refer to the 2003 SWEEP/SIGNAL GENERATOR CONTROL CHASSIS OPERATION AND SERVICE MANUAL for 2003 operation.

CAUTION

Ensure the 2003 POWER switch is in the OFF position before proceeding.

b. Connect the equipment as shown in figure 4-1.

c. Insert the 3305 into Area 1 of the 2003 CONTROL CHASSIS and tighten the 3305 front panel knurled fastening knob.

d. Set the 3305 Mode Switch to the f_1/f_2 position.

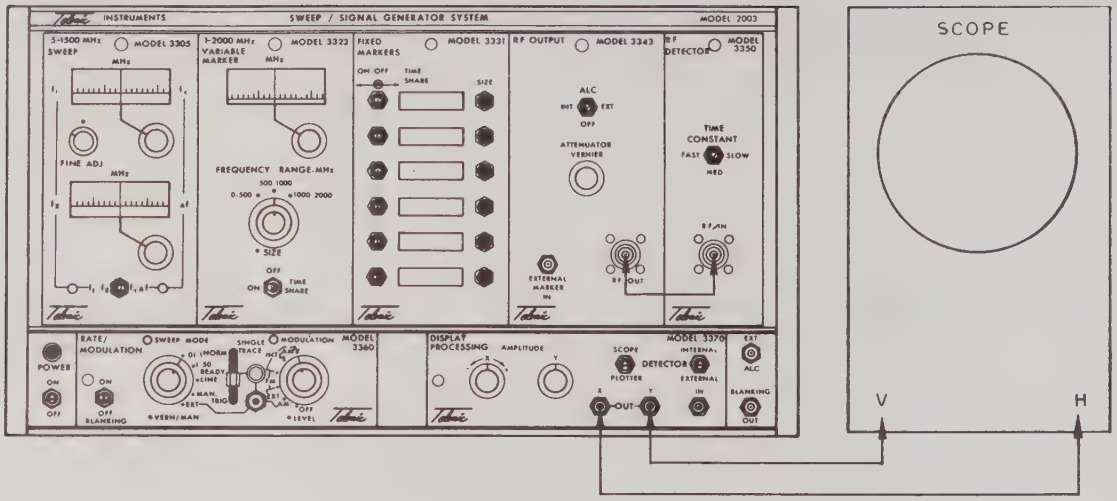

Figure 4-1. Typical Performance Check Test Connections

e. Adjust the f_1-f_c control to 0 on the upper tape dial.

f. Adjust the f_2-Δf control to 1500 MHz on the lower tape dial.

g. Set the FINE FREQ ADJ to its center position, indicated by dot.

h. Turn the 2003 POWER switch to the ON position.

i. Turn on the desired marker and observe the oscilloscope for the proper marker indication. ie. With the 100 MHz markers turned on, observe the oscilloscope for a marker every 100 MHz up to 1500 MHz.

j. Set the 3305 Mode switch to the $f_c/\Delta f$ position.

k. Adjust the f_1-f_c control to the desired center frequency and note that the sweep width is approximately 150 MHz wide.

l. Vary the FINE ADJ thru its full range and observe the oscilloscope for an approximate 15 MHz shift of the markers.

m. Adjust the f_2-Δf control to ensure sweep width can be reduced to approximately 200 kHz.

4-7. ALIGNMENT. (Refer to figure 4-2.)

4-8. Complete alignment of the 3305 is not normally necessary. With the exception of the oscillator modules, only the cards that have been altered will require alignment. Physical alteration of the oscillator modules will necessitate appropriate linearity card alignment and oscillator alignment.

4-9. The following procedure shows the required steps for individual circuit alignment.

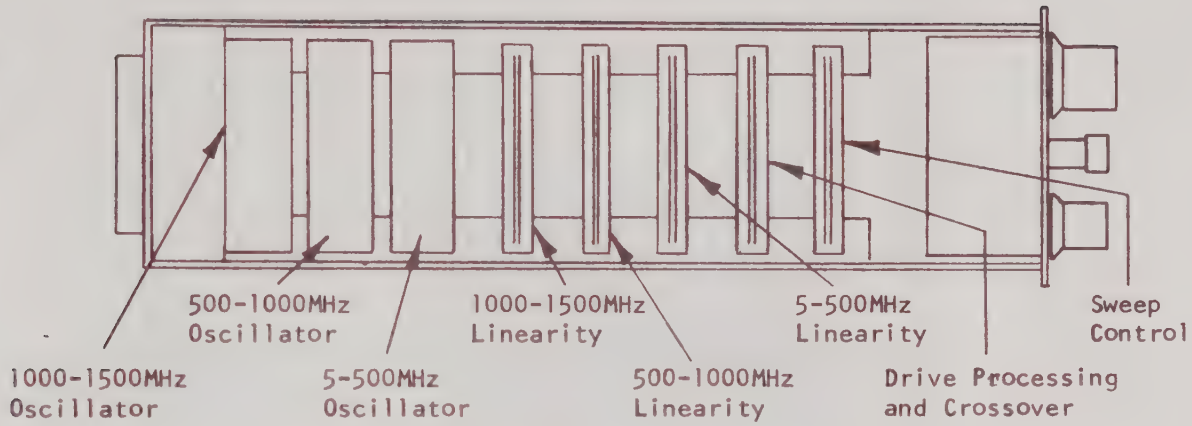

Figure 4-2. 3305 Module & Card Locations

4-10. SWEEP CONTROL ADJUSTMENT. (Refer to figure 4-3.)

a. Turn the 2003 POWER switch to the OFF position and remove the 3305 from the 2003 CONTROL CHASSIS.

b. Connect the rear panel 36 pin connector of the 3305 to the 2003, using the 36 wire connector cable from the Test Cable Set.

c. Remove the Sweep Control Card from its socket and plug it into the card extender supplied with the Test Cable Set and plug the extender into the original socket.

CAUTION

Ensure that the Sweep Control card's position in the extender is the same as it was in the socket.

d. Connect the rear panel RF connector of the 3305 to the 2003 using the appropriate extension cable from the Test Cable Set.

e. Adjust the Sweep/Signal Generator's controls as follows:

(1)	ALC	OFF
(2)	MODULATION	OFF
(3)	BLANKING	ON
(4)	SWEEP MODE	LINE
(5)	SINGLE TRACE	NORMAL
(6)	POWER	ON

f. Set the differential voltmeter controls for a 100 VDC full scale reading.

g. Connect the voltmeter input lead to pin 9 of the Sweep Control Card and the voltmeter common lead to chassis ground.

h. Adjust Bias control R5 for a voltmeter reading of exactly +10 VDC ± 0 VDC. (Lower the voltmeter scale for the most accurate reading possible).

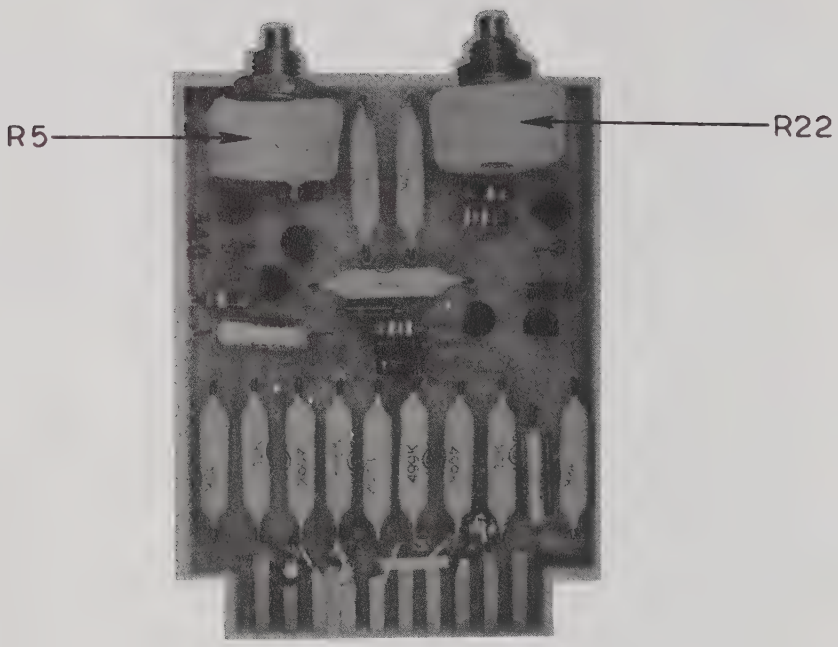

Figure 4-3. Sweep Control Card

i. Move the voltmeter input lead to pin B and adjust Bias control R22 for exactly -10 ± 0 VDC.

j. Turn the 2003 POWER switch to OFF position and return the Sweep Control Card to its original socket.

4-11. DRIVE PROCESS AND CROSSOVER ADJUSTMENT.

a. Connect the equipment as shown in figure 4-4.

b. Turn the 2003 POWER switch to the ON position.

c. Set the 3305 Mode Switch to the f_1/f_2 position.

d. Adjust the f_1-f_c control to 0 on the upper tape dial.

e. Adjust the f_2-Δf control to 1500 MHz on the lower tape dial.

f. Adjust the oscilloscope controls for 10 cm horizontal deflection.

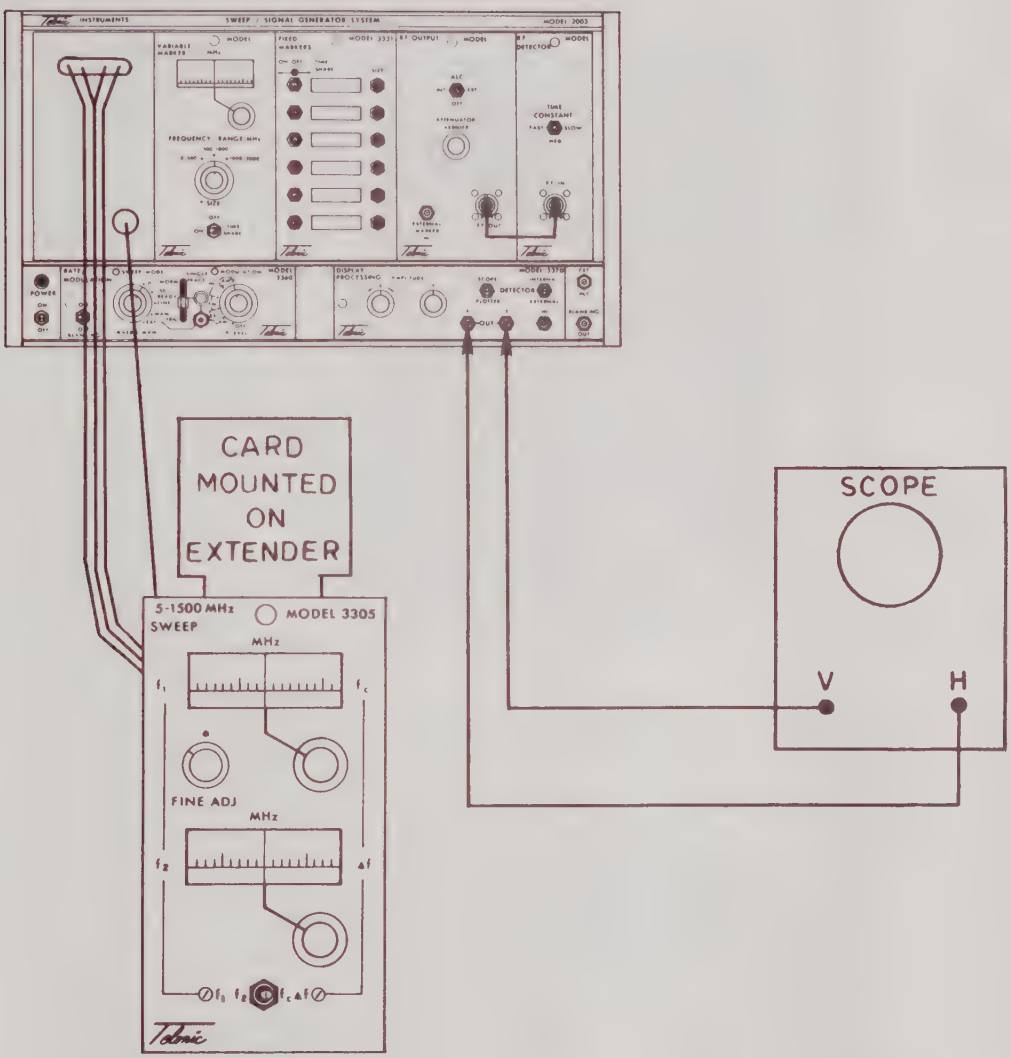

Figure 4-4. Typical Drive Process And Crossover Adjustment Test Connections

g. Adjust R28 on the Drive Processing and Crossover card to put the first switching transient point 3.33 cm in from the left edge of the trace. (Refer to figure 4-5.)

h. Adjust R42 on the card to put the other switching transient point 3.33 cm in from the right edge of the trace.

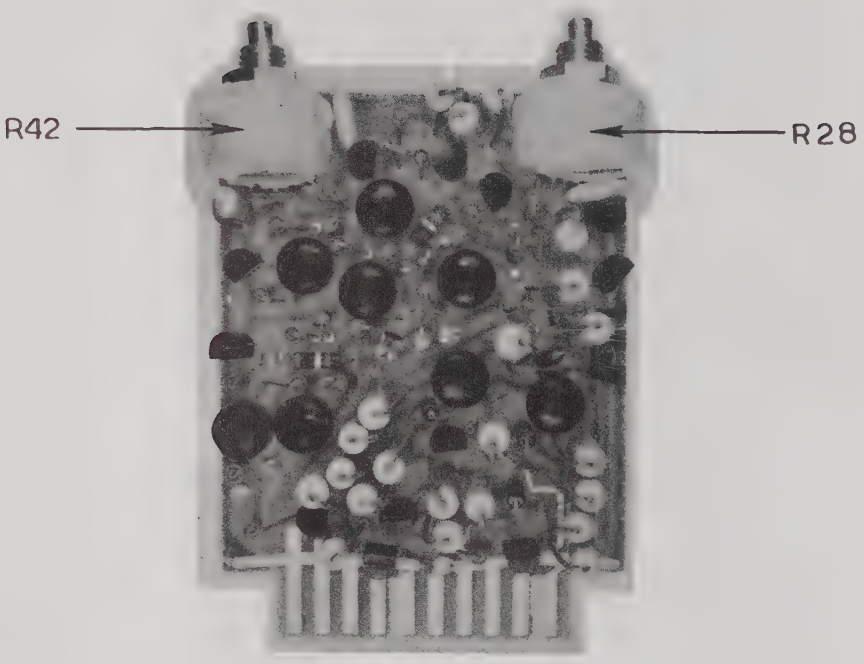

Figure 4-5. Drive Processing And Crossover Card

NOTE

Set the 3305 controls as in paragraph 4-11., c. thru e., before performing any of the Linearity Adjustment procedures.

4-12. 5-500 LINEARITY ADJUSTMENT.

a. Connect the equipment as shown in figure 4-6.

b. Turn the 2003 POWER switch to the ON position.

c. Set the oscilloscope controls as follows:

(1) Sensitivity	10 volts/cm
(2) Vertical	+DC input

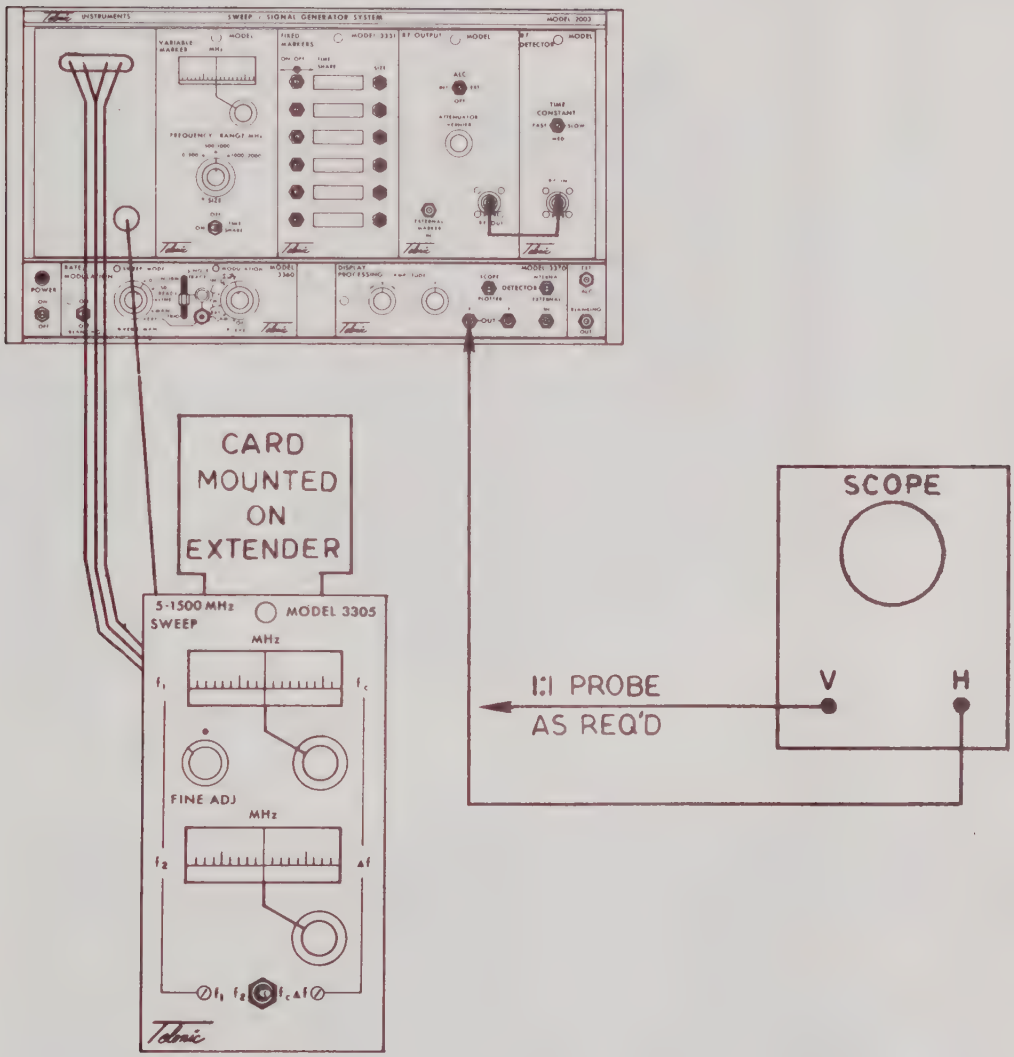

Figure 4-6. Typical Linearity Card Adjustment Test Connections

d. Set the FINE ADJ control to the center position, indicated by dot.

e. Refer to figure 4-7. to locate parts called for in the following steps:

(1) With the oscilloscope probe held to the case (collector) of transistor Q1, adjust resistors R3 and R8 for the display shown in view A of figure 4-8.

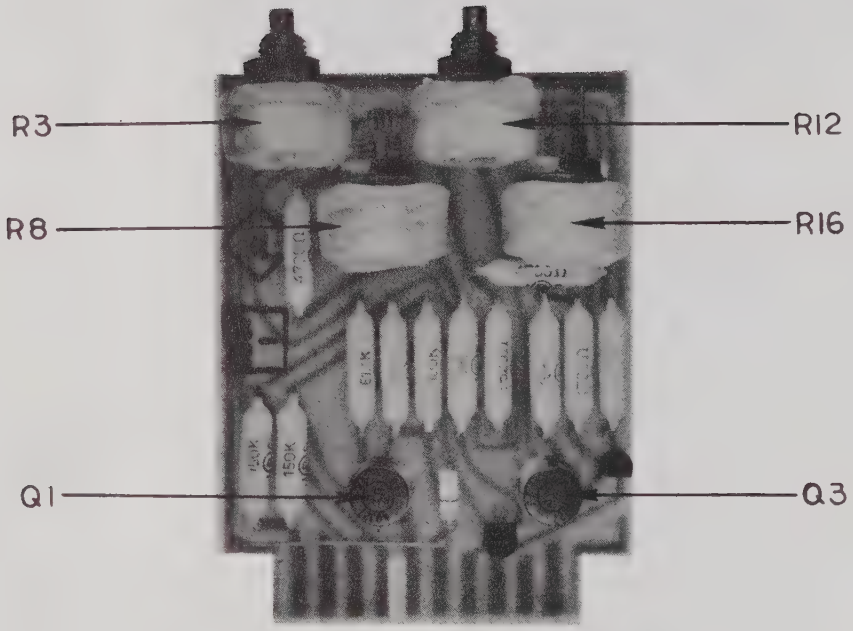

Figure 4-7. 5-500 Linearity Card

(2) With the oscilloscope probe held to the case of transistor Q3, adjust resistors R12 and R16 for the display shown in view B of figure 4-8.

f. Remove the probe from the oscilloscope and connect the Y output of the ~~3360~~ 3370 to the oscilloscope.

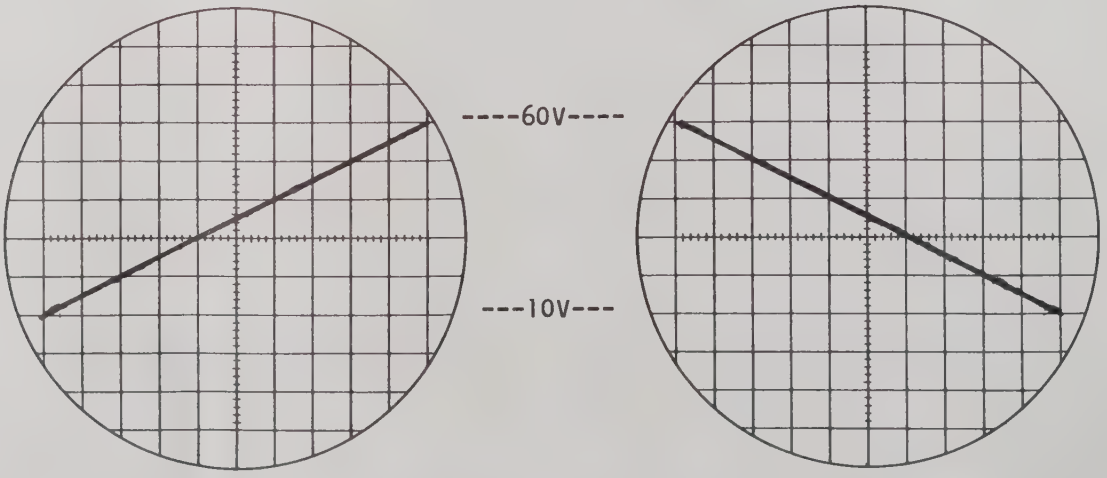

Figure 4-8. Typical 5-500 Linearity Card Waveforms

g. Using the 3323 VARIABLE MARKER PLUG-IN UNIT, determine that the left crossover transient point is at ~~510~~ MHz.

NOTE

If necessary, touch up the adjustment of resistors R3, R8, R12 and R16 to obtain crossover at exactly ~~510~~ MHz.

h. Set the Mode Switch to the $f_c/\Delta f$ position.

i. Adjust resistors R3 and R8 as necessary to center zero frequency on the oscilloscope.

j. Adjust the f_1-f_c control to center the left crossover transient point.

k. Adjust resistors R12 and R16 as necessary to center the 510 MHz marker on the oscilloscope.

l. Repeat steps i thru k as necessary.

4-13. 500-1000 LINEARITY ADJUSTMENT. (Refer to figure 4-9.)

a. Connect the equipment as shown in figure 4-5.

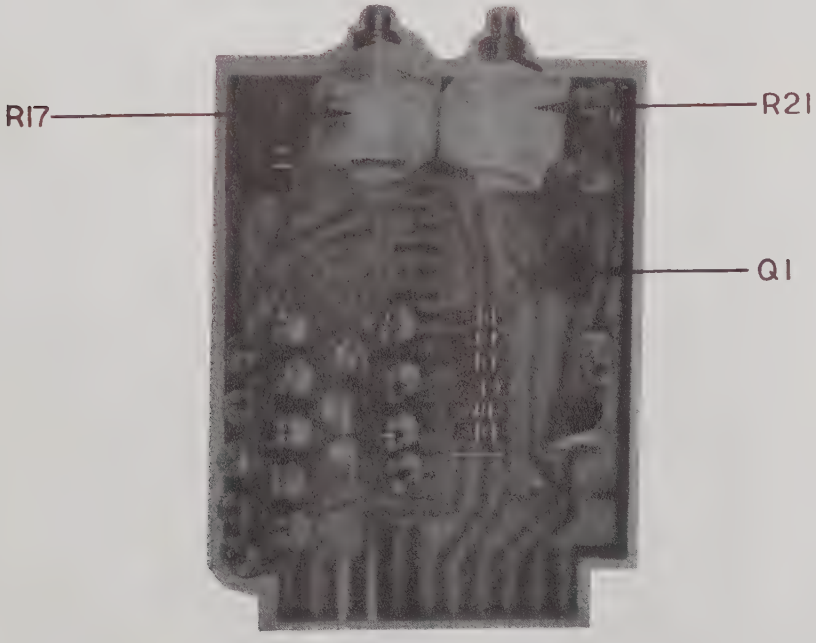

Figure 4-9. 500-1000 Linearity Card

b. Set the Mode Switch to the f_1/f_2 position.

c. Set the f_1-f_c control to the left crossover transient point.

d. Adjust the f_2-Δf control to the right crossover transient point.

e. Adjust resistors R17 and R21 until the oscillator sweeps from 490 to 1010 MHz.

f. Set the Mode Switch to the $f_c/\Delta f$ position.

g. Using the 3323 set for 490 MHz, adjust resistors R17 and R21 to center the 490 MHz marker to the crossover transient point on the oscilloscope.

h. Set the f_1-f_c control to the right crossover transient point and set the 3323 for a 1010 MHz marker.

i. Adjust resistors R17 and R21 to center the marker and the crossover transient point on the oscilloscope.

j. Repeat, as necessary, steps g. thru i.

4-14. 800-1500 LINEARITY ADJUSTMENT. (Refer to figure 4-10.)

a. Connect the equipment as shown in figure 4-5.

b. Set the Mode Switch to the f_1/f_2 position.

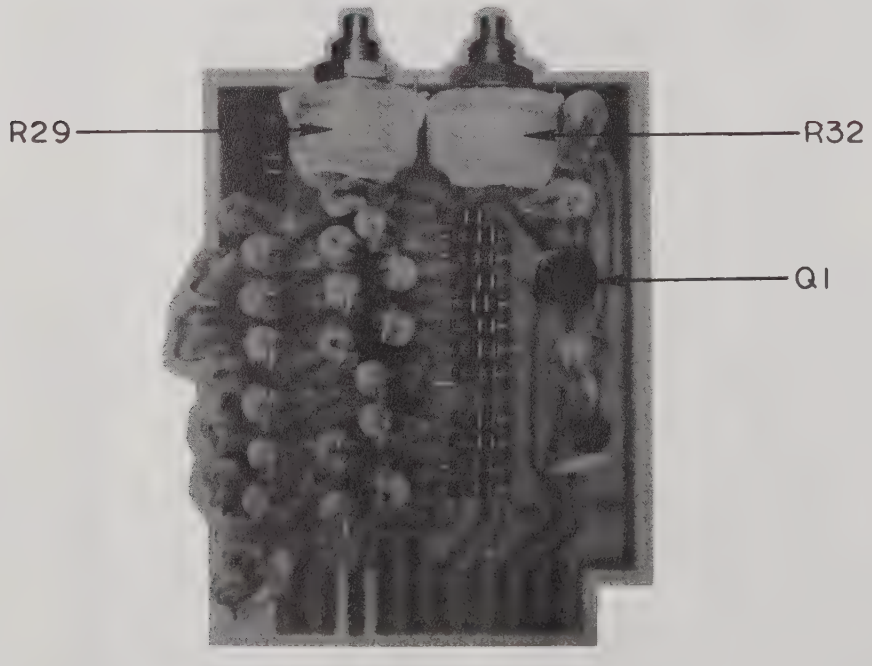

Figure 4-10. 800-1500 Linearity Card

c. Set the f_1-f_c control to the right crossover transient point.

d. Set the f_2-Δf control to 1500 MHz.

e. Adjust the 3323 to 1500 MHz.

f. Adjust resistors R31 and R34 to end the sweep at 1500 MHz.

g. Adjust the 3323 for an indication of 990 MHz.

h. Adjust resistors R31 and R34 to start the sweep at the 990 MHz marker.

i. Set the Mode Switch to the $f_c/\Delta f$ position.

j. Adjust resistors R31 and R34 to center the 990 MHz marker and the crossover point on the oscilloscope.

k. Adjust the 3323 for an indication of 1500 MHz.

l. Set the f_1-f_c control for an indication of 1500 MHz.

m. Adjust resistors R31 and R34 to center the marker on the oscilloscope; repeat steps j. thru m. as necessary.

4-15. 5-500 MHz OSCILLATOR MODULE REMOVAL AND ALIGNMENT.

a. With the 3305 removed from the 2003 CONTROL CHASSIS, disconnect the RF connector and the five wires connected to the pins of the module base.

b. Remove the two mounting screws from the module base.

c. Remove the eight retaining screws from the top cover and lift the cover from the module.

d. Remove the cover from the component side of the printed circuit board by removing the two screws holding the cover to the base of the module.

e. Using jumpers and appropriate extension cables from the Test Cable Set, reconnect the oscillator module to the 3305.

f. Connect the equipment as shown in figure 4-11.

g. Perform the 5-500 MHz linearity adjustment described in paragraph 4-12., steps a. thru l. before proceeding.

h. Set the oscilloscope controls as follows:

(1) Vertical Sensitivity 0.5 V/cm

(2) Sweep Mode Horizontal Amplifier

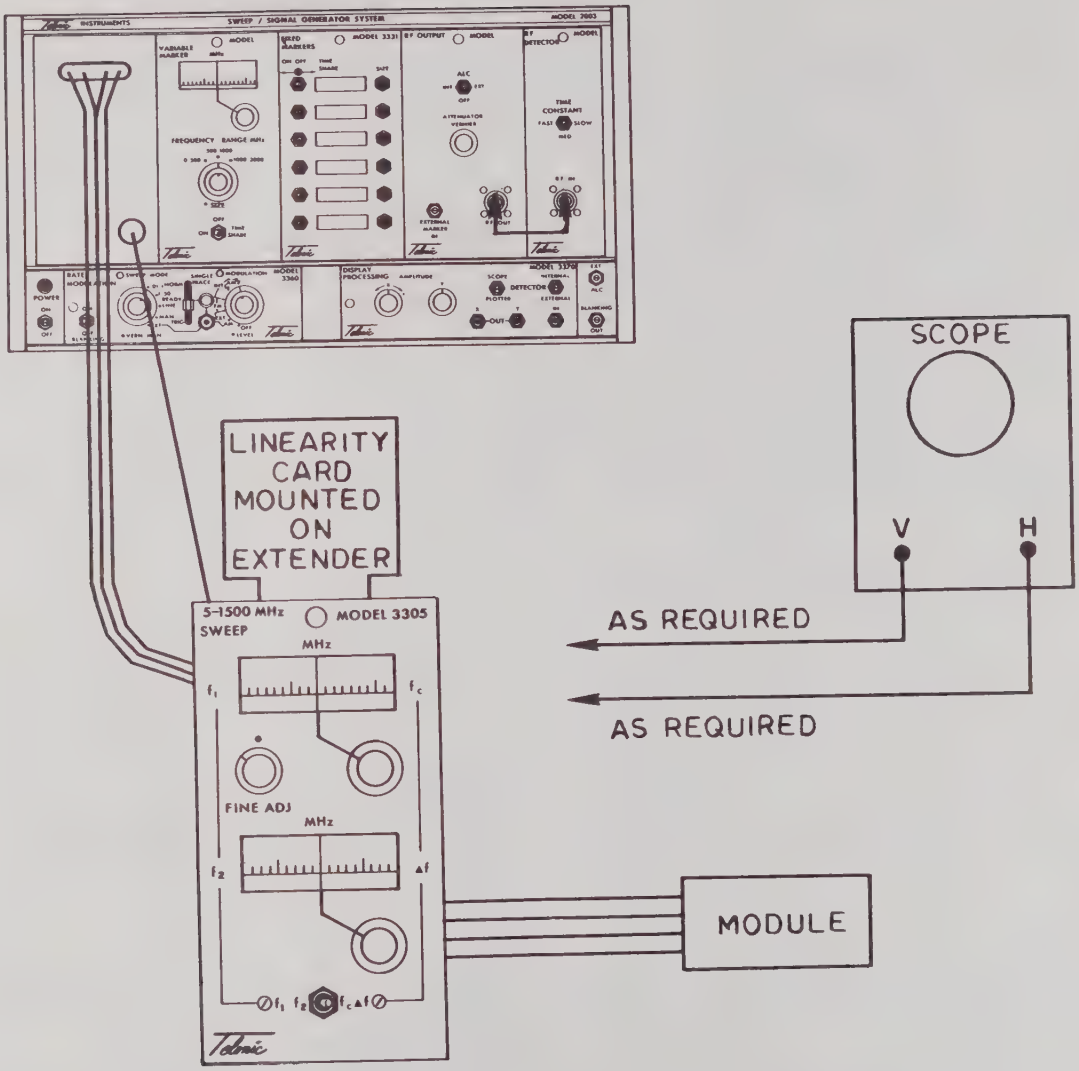

Figure 4-11. Oscillator Alignment Test Connections

i. Set the 2003 controls as follows:

(1)	ALC (3343)	INT.
(2)	POWER (2003)	ON
(3)	BLANKING (3360)	ON
(4)	SWEEP MODE (3360)	LINE
(5)	SINGLE TRACE (3360)	NORMAL
(6)	MODULATION (3360)	OFF
(7)	SCOPE/PLOTTER Switch (3370)	SCOPE
(8)	DETECTOR (3370)	INTERNAL
(9)	TIME CONSTANT (3350)	FAST
(10)	ATTENUATOR VERNIER	for level display

j. Set the 3305 controls as follows:

(1)	f_1-f_c	fully counterclockwise
(2)	f_2-Δf	500 MHz
(3)	f_1/f_2-$f_c/\Delta f$ Mode Switch	f_1/f_2 Mode
(4)	Max Level Adjustment	fully clockwise
(5)	FINE ADJ	center range (dot)

k. Refer to figure 4-12. to identify components that are critical to the alignment of the oscillator module.

l. Connect the oscilloscope to the X and Y connectors of the 3370.

m. Observe the oscilloscope display for a minimum of 500 mV across the sweep range; adjust mixer coupling inductors L11, L12 and L14 if the display does not meet this voltage standard.

n. Disconnect the RF extension cable from the oscillator module and connect the RF Probe Loop to this extension cable.

p. Link couple inductor L15 to the RF Probe Loop and observe the oscilloscope response curve.

q. Using the 3323 Variable Marker Plug-in Unit, locate and record the maximum and minimum frequencies of operation of this oscillator.

r. The range should be from 1350 to 1600 MHz ±50 MHz and may be shifted by varying the length of inductor L15.

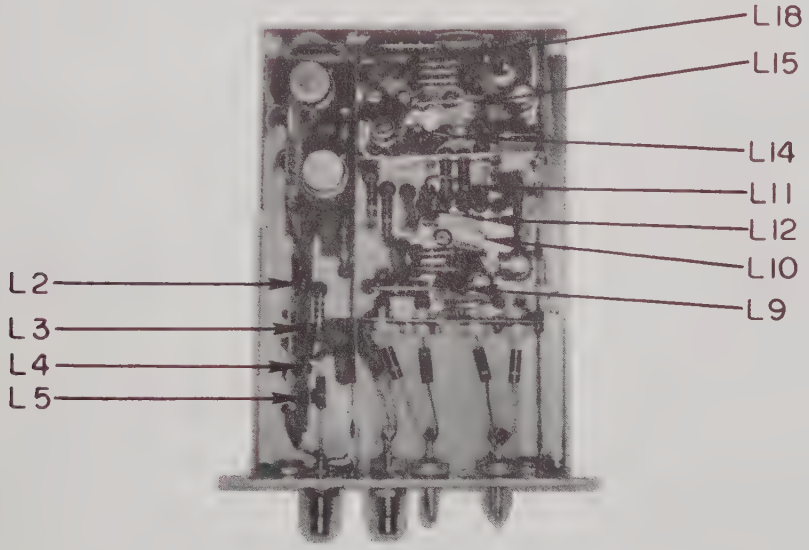

Figure 4-12. 5-500 MHz Oscillator Module

s. Move the RF Probe Loop to inductor L10 and, using the 3323, locate and record the maximum and minimum frequencies of this oscillator.

t. The range should be from 1350 to 1100 MHz ±50 MHz; the highest frequency from this oscillator should be at least equal to the lowest frequency recorded in step h and the lowest frequency of this oscillator should be at least 500 MHz lower than the highest frequency recorded in step h.

NOTE

The range of operation of this oscillator can be shifted by varying the length of inductor L10.

u. Remove the RF jumper cable connecting the RF Output Plug-in Unit and the Detector Plug-in Unit.

v. Connect the RF Power Meter to the RF Output Plug-in Unit and measure the output power; the reading should be a minimum of 5 mW at all positions of the f_1-f_c control.

w. The output power may be increased to 5 mW by adjusting the coupling of inductors L11, L12, and L14 and by adjusting the turns spacing of inductors L9 and L18.

x. Return the control as described in steps h, i and j.

y. Turn the 3323 Variable Marker Plug-in Unit ON-OFF-TIME SHARE switch to the ON position.

z. Adjust the FREQUENCY RANGE-MHz control to the 500-1000 position, and adjust the variable frequency control for an indication of 500 on the Tape dial; the marker should appear at the far right edge of the flat portion of the oscilloscope display.

aa. Turn the 2003 Power Switch to the OFF position, replace the module in the 3305, and return the 3305 to the 2003 CONTROL CHASSIS.

4-16. 500-1000 MHz OSCILLATOR MODULE REMOVAL AND ALIGNMENT.

a. With the 3305 removed from the 2003 CONTROL CHASSIS, disconnect the RF connector and the four wires connected to the pins of the module base.

b. Remove the two mounting screws from the module base.

c. Remove the three retaining screws and lift off the module cover.

d. Using jumpers and appropriate extension cables from the Test Cable Set, reconnect the oscillator module to the 3305.

e. Connect the equipment as shown in figure 4-11.

f. Set oscilloscope controls as follows:

(1)	V Input	100 Volts
(2)	Display Function	V vs H
(3)	Sweep Mode	OFF

g. Set Sweep Generator controls as follows:

(1)	ALC	OFF
(2)	MODULATION	OFF
(3)	BLANKING	ON
(4)	SWEEP MODE	LINE
(5)	SINGLE TRACE	NORM.

h. Connect an oscilloscope probe to the case of transistor Q1 on the 500-1000 MHz Linearity Card.

i. Set the f_1/f_2-$f_c/\Delta f$ switch of the 3305 to the f_1/f_2 position.

j. Rotate the f_1-f_c control to the left crossover transient point.

k. Rotate the f_2-Δf control to the right crossover transient point.

l. Observe the oscilloscope indication, the linearity curve should start from 0 volts and rise to approximately 60 volts. This indication can be adjusted by variable resistors R17 and R21 on the 500-1000 MHz linearity card. (Refer to figure 4-8.)

m. Refer to figure 4-13. to identify components critical to the alignment of the 500-1000 MHz Oscillator Module.

n. Connect the oscilloscope to the X and Y connectors of the 3370.

p. Observe the oscilloscope display for a minimum of 0.5 VDC across the complete range; adjust inductor L18 if the display does not meet this voltage standard.

q. Set the Mode Switch to the $f_c/\Delta f$ position.

r. Using the 3323, determine that the oscillator oscillates at no more than 490 MHz.

s. Rotate the f_1-f_c control to the right hand crossover point and determine that the oscillator is oscillating to at least 1010 MHz.

NOTE

If the oscillator does not track the range of 490 to 1010 MHz the length of wire between capacitor C12 and diode CR3 may be increased or decreased to change the oscillator range.

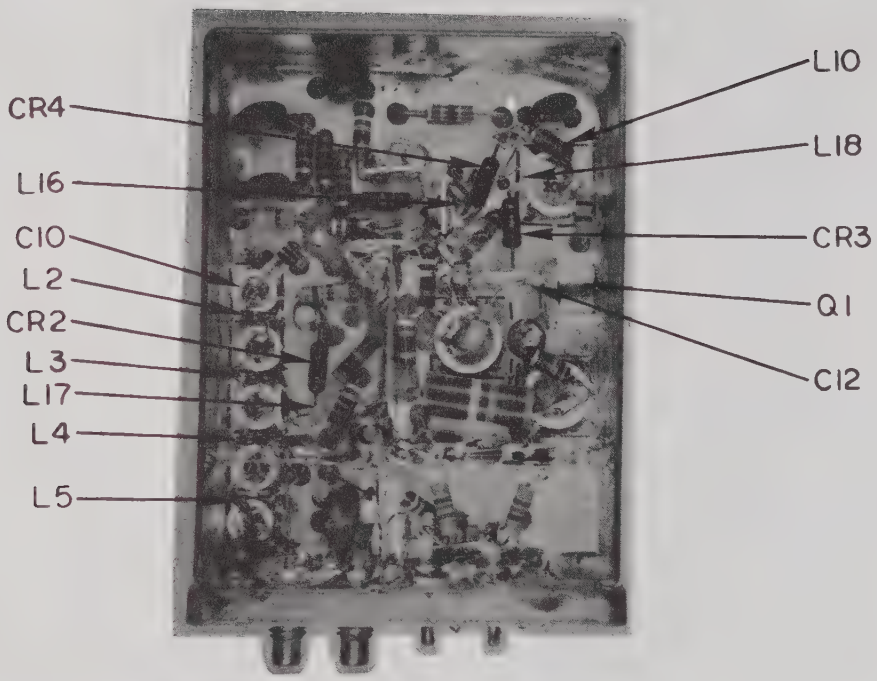

Figure 4-13. 500-1000 MHz Oscillator Module

t. Turn the equipment off and restore the module to its original position in the 3305.

4-17. 800-1500 MHz OSCILLATOR MODULE REMOVAL AND ALIGNMENT.

a. With the 3305 removed from the 2003 CONTROL CHASSIS, disconnect the RF connector and the four wires connected to the module base pins.

b. Remove the two mounting screws from the module base.

c. Remove the cover from the module by removing the three retaining screws.

d. Using jumpers and appropriate extension cables from the Test Cable Set, reconnect the oscillator module to the 3305.

e. Connect the equipment as shown in figure 4-11.

f. Set oscilloscope controls as follows:

(1)	V Input	100 Volts
(2)	Display Function	V vs H
(3)	Sweep Mode	OFF

g. Set Sweep Generator controls as follows:

(1)	ALC	OFF
(2)	MODULATION	OFF
(3)	BLANKING	ON
(4)	SWEEP MODE	LINE
(5)	SINGLE TRACE	NORM.

h. Connect an oscilloscope probe to the case of transistor Q1 on the 800-1500 MHz Linearity Card.

i. Set the Mode switch of the 3305 to the f_1/f_2 position.

j. Rotate the f_1-f_c control to the right crossover transient point.

k. Rotate the f_2-Δf control fully clockwise.

l. Observe the oscilloscope indication; the linearity curve should start from 10 volts and rise to approximately 60 volts. This indication can be adjusted by variable resistors R29 and R32 on the 800-1500MHz linearity card. (Refer to figure 4-10.)

m. Refer to figure 4-14. to identify components critical to the alignment of the 800-1500 MHz Oscillator Module.

n. Connect the oscilloscope to the X and Y connectors of the 3370.

p. Observe the oscilloscope display for a minimum of 500 mV across the complete range; adjust inductor L14 if the display does not meet this voltage standard.

q. Set the Mode Switch to the $f_c/\Delta f$ position.

r. Using the 3323, determine that the oscillator oscillates at no more than 990 MHz.

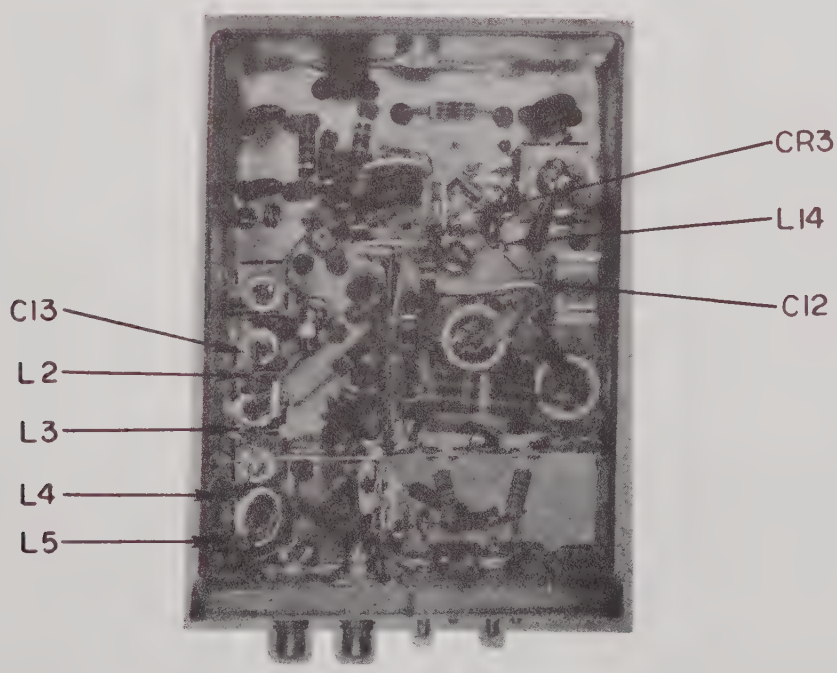

Figure 4-14. 800-1500 MHz Oscillator Module

s. Rotate the f_1-f_c control fully clockwise and determine that the oscillator is oscillating to at least 1510 MHz.

NOTE

If the oscillator does not track the range of 990 to 1510 MHz, inductor L14 may be adjusted to correct the range.

t. Turn the equipment off and restore the module to its original position in the 3305.

4-17. LINEARITY CHECK

a. Connect the equipment as shown in figure 4-15.

b. Set the 2003 controls as follows:

(1)	ALC (3343)	INT
(2)	SWEEP MODE (3360)	LINE
(3)	MODULATION (3360)	OFF
(4)	BLANKING (3360)	ON
(5)	DETECTOR (3370)	INT

c. Turn on the 3331 10 MHz harmonic markers.

d. Set the 3305 Mode Switch to the f_1/f_2 position.

e. Set the 3305 f_1-f_c control to 10 MHz.

f. Set the 3305 f_2-Δf control to 30 MHz.

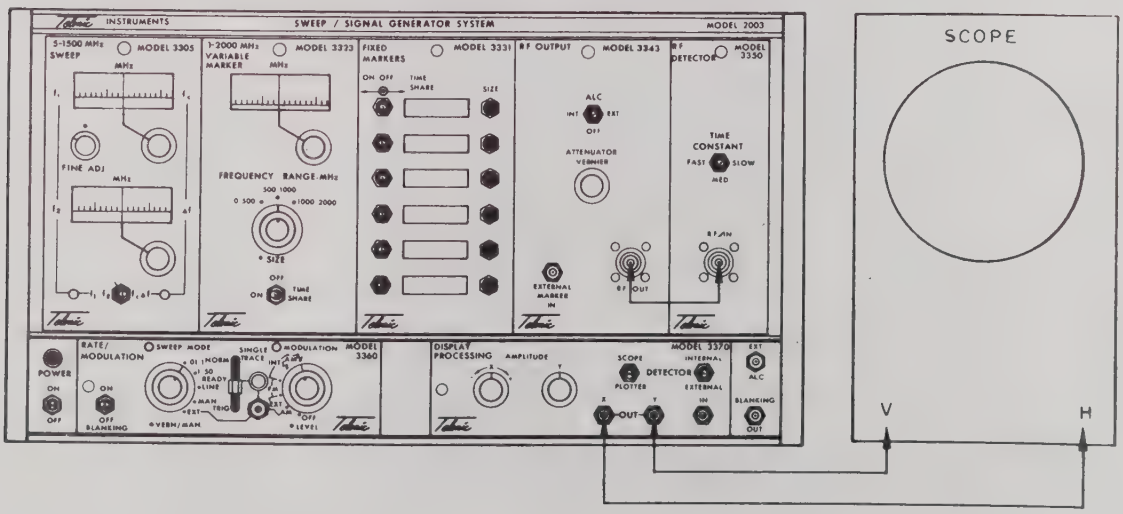

Figure 4-15. Typical Linearity Check Test Connections

g. Set the oscilloscope for 10 cm of horizontal display.

h. The display will now appear as shown in figure 4-16.

NOTE

It may be necessary to vary the f_2-Δf control slightly to obtain the display as shown.

i. Measure and record the displacement of the central marker from the center of the screen.

j. Using the displacement recorded in step i., and the following formula, determine the absolute linearity.

$$\text{Linearity} = \frac{5 + X}{5}$$

(Where X is the displacement measured in centimeters, step i.)

k. Set the f_1-f_c and f_2-Δf controls 10 MHz higher than their present settings.

l. Repeat steps i. thru k. until the full range of the oscillator has been covered.

NOTE

Checking the linearity every 10 MHz ensures its accuracy for any wider increments.

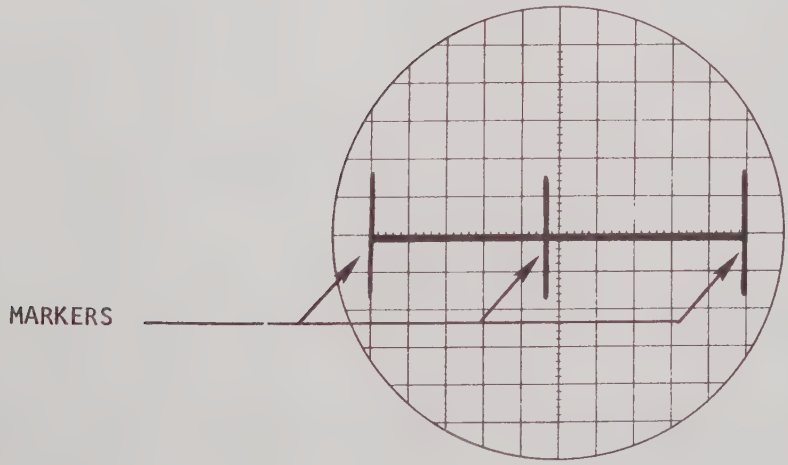

Figure 4-16. Typical Linearity Check Waveform

4-18. FLATNESS CHECK.

a. Connect the equipment as shown in figure 4-17.

NOTE

All RF Cable lengths must be kept to a minimum.

b. Set the 2003 Controls as follows:

(1)	POWER (2003)	ON
(2)	BLANKING (3360)	ON
(3)	SWEEP MODE (3360)	MAN.
(4)	MODULATION (3360)	OFF
(5)	ALC (3343)	INT
(6)	VERN/MAN. (3360)	fully counterclockwise
(7)	Mode Switch (3305)	f_1/f_2
(8)	f_1-f_c (3305)	50 MHz
(9)	$f_2-\Delta f$ (3305)	1500 MHz

c. Adjust the TTF72-5-5EE tunable filter from the Tunable Bandpass Filter Kit to 50 MHz.

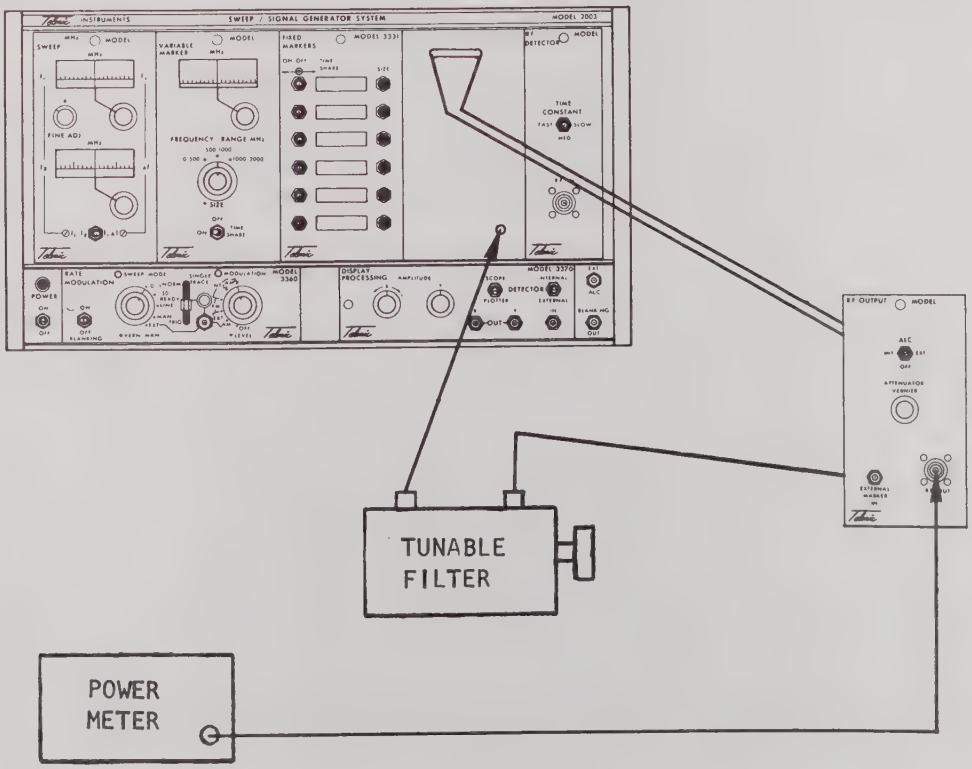

Figure 4-17. Typical Flatness Check Test Connections

d. While observing the power meter, adjust the ATTENUATOR VERNIER (3343) for 2.45 mW of output power.

e. While observing the power meter, adjust (simultaneously) the Tunable Filter and the VERN/MAN. (3360) through the filter's complete frequency range. (to 95 MHz)

f. Any variations in the power meter reading will be less than ±0.5 dB.

NOTE

In computing step f., allowances for inherant Power Meter error must be made.

g. Repeat step e. for frequencies up to 1500 MHz using appropriate Tunable Filters.

CAUTION

The unique electronic band-switching employed in the 3305, provides overlapping sweep at approximately 500 and 1000 MHz. A small amount of back-tracking with the filter to compensate for this overlap will be necessary at these points.

4-19. POWER OUTPUT ADJUSTMENT.

a. Connect the equipment as shown in figure 4-1.

b. Set the 2003 controls as follows:

(1) f_1-f_c (3305)	0 MHz
(2) f2-Δf (3305)	1500 MHz
(3) Mode Switch (3305)	f_1/f_2
(4) ALC (3343)	INT
(5) SWEEP MODE (3360)	LINE
(6) MODULATION (3360)	OFF
(7) BLANKING (3360)	ON
(8) DETECTOR (3370)	INTERNAL

c. Set the oscilloscope controls as follows:

(1) Vertical Sensitivity	1.0 Volt full scale
(2) Sweep Mode	Horizontal Amplifier

d. Set the ATTENUATOR VERNIER control fully clockwise.

e. Adjust the Maximum Level adjustment for desired output voltage (approximately 0.5 V maximum).

f. Turn the ATTENUATOR VERNIER control fully counterclockwise.

g. Set the Minimum Level adjustment for an indication 3 dB below the voltage obtained in step c.; if necessary, repeat steps d. thru g. until desired indications are obtained.

SECTION V

PARTS LIST AND SCHEMATIC DIAGRAMS

5-1. GENERAL.

5-2. This section provides the complete electrical parts list and a complete set of schematic diagrams required for maintenance of the 3305 SWEEP OSCILLATOR PLUG-IN UNIT.

5-3. ASSEMBLY CIRCUIT REFERENCE NUMBERING SYSTEM.

5-4. Table 5-1. specifies the number for each assembly in the 3305.

5-5. All component groups in each assembly are numbered in sequence from one.

TABLE 5-1.

Assembly Numbers	
970433	Chassis Interconnection
970312	Sweep Control Card
970425	Drive Processing/Crossover Switch Card
970356	5-500 MHz Linearity Card
970567	5-500 MHz Heterodyne Oscillator/ Amplifier Module
970314	500-1000 MHz Linearity Card
970350	500-1000 MHz Oscillator Module
970313	800-1500 MHz Linearity Card
970351	800-1500 MHz Oscillator Module
970418	RF Switch

5-6. ABBREVIATION CODE.

5-7. Table 5-2. specifies the abbreviations used for components in the 3305 parts list.

TABLE 5-2.

Abbreviation	Code
CFC	Capacitor, Fixed, Ceramic
CFCF	Capacitor, Fixed, Ceramic, Feed-thru
CFD	Capacitor,Fixed, Discap
CFE	Capacitor, Fixed, Electrolytic
CFF	Capacitor, Fixed, Metal Film
CFM	Capacitor, Fixed, Mica
CFMY	Capacitor, Fixed, Mylar
CFN	Capacitor, Fixed, Composition
CFO	Capacitor, Fixed, Oil
CFP	Capacitor, Fixed, Paper
CFPE	Capacitor, Fixed, Polyester
CFT	Capacitor, Fixed, Teflon
CFTA	Capacitor, Fixed, Tantalum
CVA	Capacitor, Variable, Air
CVG	Capacitor, Variable, Glass-Dielectric
CTCD	Capacitor, Trimmer, Ceramic, Disc
CTCT	Capacitor, Trimmer, Ceramic, Tubular
DS	Diode, Semiconductor
DSV	Diode, Semiconductor, Varactor
IF	Inductor, Fixed
IV	Inductor, Variable
PC	Plug, Cable
PO	Part of
RFC	Resistor, Fixed, Composition
RFCF	Resistor, Fixed, Carbon Film
RFMF	Resistor, Fixed, Metal Film
RFWW	Resistor,Fixed, Wirewound
RJ	Receptacle, Jack
RVC	Resistor, Variable, Composition
RVDC	Resistor, Variable, Dual Composition
RVDWW	Resistor, Variable, Dual, Wirewound/ Composition
RVWW	Resistor, Variable, Wirewound
SA	Same as
SC	Subject to Change
SWT	Switch, Toggle
TC	Terminator, Cable
TR	Transistor
TRFE	Transistor, Field Effect

5-8. PARTS LIST.

5-9. Tables 5-3. through 5-13. provide the complete electrical parts list for each assembly in the 3305.

5-10. SCHEMATIC DIAGRAMS.

5-11. The following schematics are included in this manual:

a.	Interconnection Schematic Diagram	Figure 5-1.
b.	Sweep Control	Figure 5-2.
c.	Drive Processing/Crossover Switch	Figure 5-3.
d.	5-500 MHz Linearity	Figure 5-4.
e.	5-500 MHz Heterodyne Oscillator/Amplifier	Figure 5-5.
f.	500-1000 MHz Linearity	Figure 5-6.
g.	500-1000 MHz Oscillator	Figure 5-7.
h.	800-1500 MHz Linearity	Figure 5-8.
i.	800-1500 MHz Oscillator	Figure 5-9.
j.	RF Switch Assembly	Figure 5-10.

5-12. All resistors are shown in ohms unless otherwise specified.

5-13. All capacitors are shown in picofarads (pF) unless otherwise specified.

5-14. All coils are shown in microhenries (μH) unless otherwise specified.

Electrical Parts List				
Interconnection Schematic Diagram (Assembly No. 970433)				
Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
J1	Socket, 20 pin	Amphenol	225-21021-101	44-0166-01
J2	Same as J1			
J3	Same as J1			
J4	Same as J1			
J5	Same as J1			
P1	Plug, Elect	Amphenol	57-20360	44-0186-01
R1	RVC, 25kΩ, 1/2W	Clarostat	#63 RV-6	29-0128-01
R2	Same as R1			
R3	RFC, 4.7kΩ, ±10%, 1/4W	Allen-Bradley	CB4721	26-1531-01
R4	RVC, 10kΩ, ±20%, 1/4W	CTS	UPE-200RE	29-0079-01
R5	RFC, 15kΩ, ±10%, 1/4W	Allen-Bradley	CB1531	26-1535-01
R6	Same as R4			
R7	RFC, 18kΩ, ±10%, 1/4W	Allen-Bradley	CB1831	26-1533-01
R8	RFC, 10kΩ, ±10%, 1/4W	Allen-Bradley	CB1031	26-1594-01
R9	RFC, 150kΩ, ±5%, 1/4W	Allen-Bradley	CB1545	26-1546-01
R10	RFC, 470kΩ, ±10%, 1/4W	Allen-Bradley	CB4741	26-1541-01
R11	RVC, 100kΩ, 1/4W	CTS	Type 200	29-0132-01
R12	RFC, 1.8MΩ, ±5%, 1/4W	Allen-Bradley	CB1855	26-1551-01
S1	Switch, 3 PDT	CTS	Series 212	37-0131-01

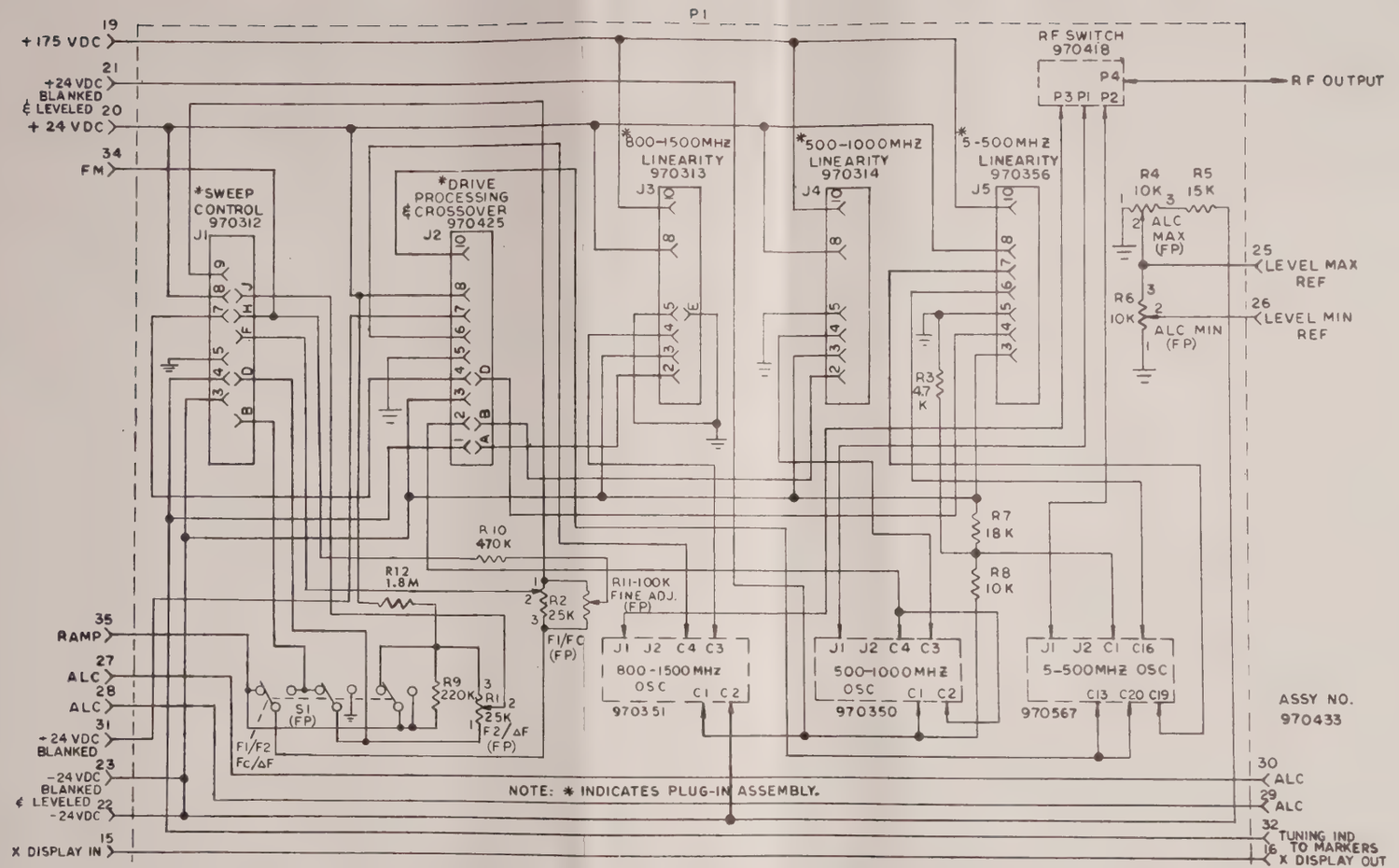

Figure 5-1. Interconnection Schematic Diagram

TABLE 5-4.

Electrical Parts List

Sweep Control (Assembly 970312)

Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
C1	CFE, 6.8μF, 35VDCW	Kemet	CS13BF685K	20-0058-01
C2	Same as C1			
CR1	DS,101	XY TAN	TEL101	41-0022-01
CR2	Same as CR1			
Q1	TR,2N3904	Motorola	2N3904	40-0041-01
Q2	TR,2N3906	Motorola	2N3906	40-0042-01
Q3	Same as Q1			
Q4	Same as Q1			
Q5	Same as Q2			
Q6	Same as Q2			
R1	RFC, 3.3kΩ, ±10%, 1/4W	Allen-Bradley	3321	26-1596-01
R2	RMF, 13kΩ, ±1%, 1/4W	IRC	CEC T-0	27-0207-01
R3	RFC, 470kΩ, ±10%, 1/4W	Allen-Bradley	CB	26-1541-01
R4	RMF, 10kΩ, ±1%, 1/2W	IRC	CEC T-0 1001F	27-0060-01
R5	RVC, 1kΩ, 1/4W	CTS	Type 200	29-0080-01
R6	RMF, 499kΩ, ±1%, 1/2W	IRC	CEC T-0	27-0222-01
R7	Same as R6			
R8	RFC, 2.2MΩ, ±5%, 1/4W	Allen-Bradley	Type CB	26-1552-01
R9	Same as R4			
R10	RFC, 47kΩ, ±10%, 1/4W	Allen-Bradley	Type CB	26-1524-01
R11	RFC, 10kΩ, ±10%, 1/4W	Allen-Bradley	CB1031	26-1594-01
R12	Same as R4			
R13	Same as R11			
R14	Same as R11			
R15	Same as R11			
R16	Same as R4			
R17	RMF, 845kΩ, ±1%, 1/2W	IRC	CEC T-0	27-0223-01
R18	Same as R6			
R19	Same as R8			
R20	RMF, 1.21MΩ, ±1%, 1/2W	IRC	CEC T-0	27-0224-01
R21	Same as R1			
R22	Same as R5			
R23	Same as R2			
R24	Same as R3			
R25	Same as R4			

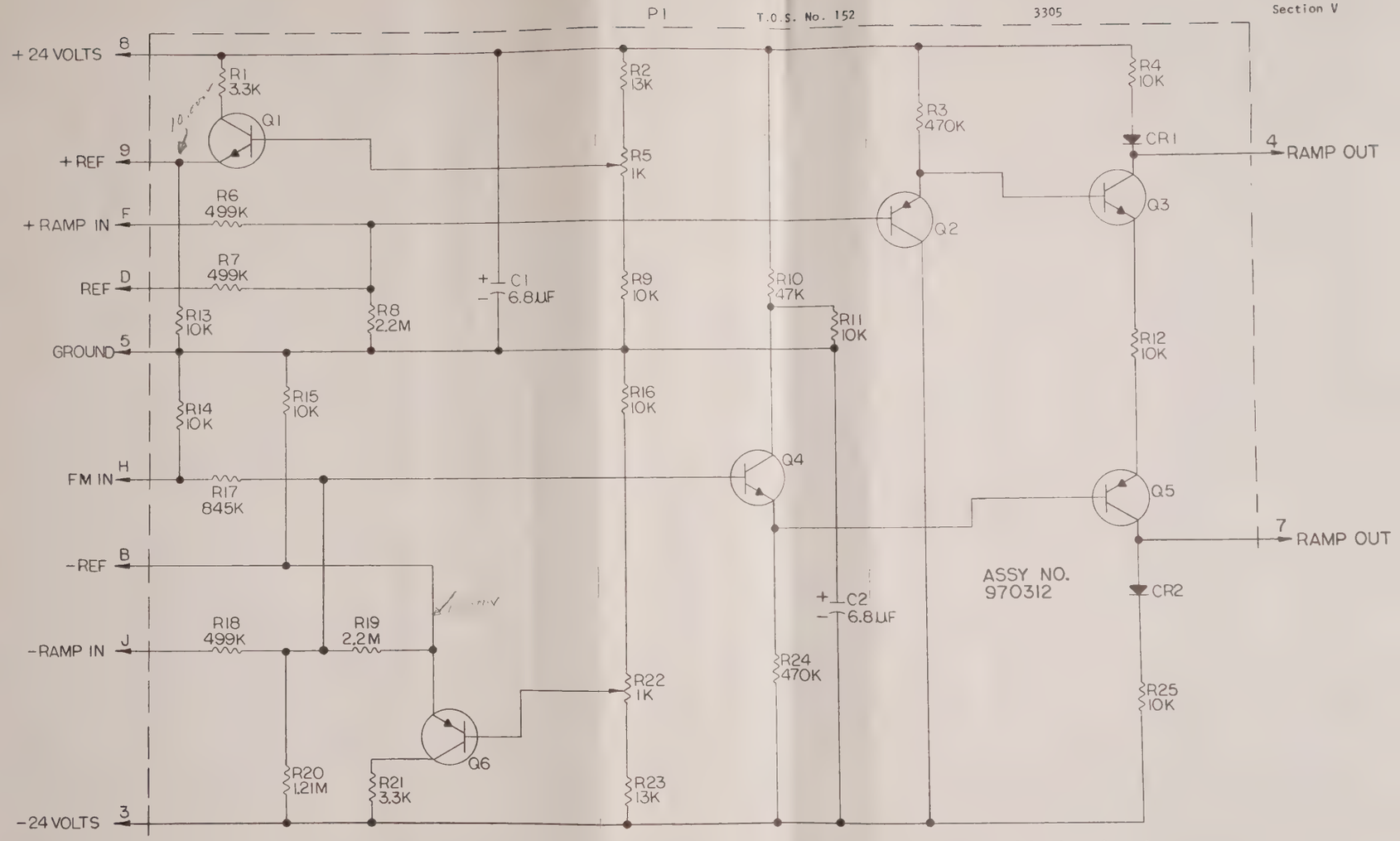

Figure 5-2. Sweep Control

Electrical Parts List

Drive Processing and Crossover (Assembly No. 970425)

Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
CR1	DS, 101	Telonic		41-0022-01
CR2	Same as CR1			
CR3	Same as CR1			
CR4	Same as CR1			
Q1	TR, 2N3904	Motorola	2N3904	40-0041-01
Q2	Same as Q1			
Q3	TR, 2N3906	Motorola	2N3906	40-0042-01
Q4	Same as Q3			
Q5	TR, 2N3545	Fairchild	2N3545	40-0037-01
Q6	Same as Q1			
Q7	TR, 2N3568	Fairchild	2N3568	40-0032-01
R1	RFC, 5.6kΩ, ±10%, 1/4W	Allen-Bradley	CB5621	26-1595-01
R2	RFMF, 18.2kΩ, ±1%, 1/2W	IRC	CEC T-0 1822F	27-0059-01
R3	RFMF, 26.7kΩ, ±1%, 1/2W	IRC	CEC T-0 2672F	27-0209-01
R4	RFMF, 1.82kΩ, ±1%, 1/2W	IRC	CEC T-0 1821F	27-0231-01
R5	RFMF, 115kΩ, ±1%, 1/2W	IRC	CEC T-0 1153F	27-0243-01
R6	RFMF, 1.3kΩ, ±1%, 1/2W	IRC	CEC T-0 1301F	27-0199-01
R7	RFMF, 20kΩ, ±1%, 1/2W	IRC	CEC T-0 2002F	27-0090-01
R8	RFMF, 1.07kΩ, ±1%, 1/2W	IRC	CEC T-0 1071F	27-0244-01
R9	RFC, 8.2kΩ, ±10%, 1/4W	Allen-Bradley	CB8221	26-1520-01
R10	Same as R2			
R11	RFMF, 7.5kΩ, ±1%, 1/2W	IRC	CEC T-0 7501F	27-0204-01
R12	RFMF, 35.7kΩ, ±1%, 1/2W	IRC	CEC T-0 3572F	27-0211-01
R13	RFMF, 5.62kΩ, ±1%, 1/2W	IRC	CEC T-0 5621F	27-0203-01
R14	Same as R9			
R15	RFMF, 8.25kΩ, ±1%, 1/2W	IRC	CEC T-0 8251F	27-0205-01
R16	RFMF, 12.1kΩ, ±1%, 1/2W	IRC	CEC T-0 1212F	27-0206-01
R17	RFMF, 4.32kΩ, ±1%, 1/2W	IRC	CEC T-0 4321F	27-0202-01
R18	RFMF, 3.01kΩ, ±1%, 1/2W	IRC	CEC T-0 3011F	27-0201-01
R19	RFMF, 30.1kΩ, ±1%, 1/2W	IRC	CEC T-0 3012F	27-0246-01
R20	RFMF, 4.75kΩ, ±1%, 1/2W	IRC	CEC T-0 4751F	27-0056-01

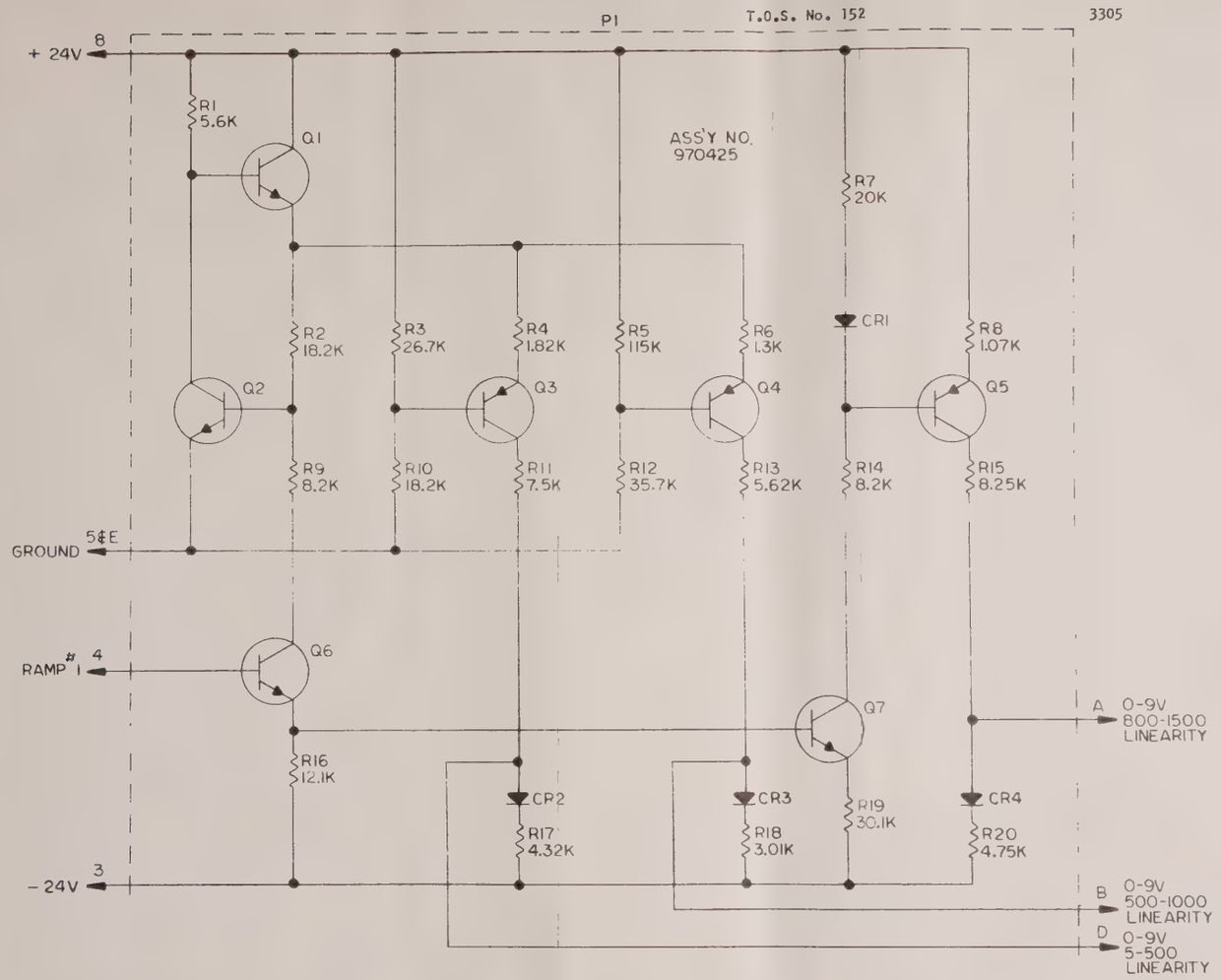

Figure 5-3. Drive Processing/Crossover Switch (Sheet 1)

TABLE 5-6.

Electrical Parts List

Drive Processing and Crossover (Assembly No. 970425)

Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
C1	CFD, 33pF, 1000VDCW	Radio Materials Corp	Type C	22-0002-01
C2	Same as C1			
CR5	DS, 1N270	Sylvania	1N270	41-0061-01
CR6	Same as CR5			
CR7	Same as CR5			
CR8	Same as CR5			
CR9	Same as CR5			
Q8	TR, 2N3906	Motorola	2N3906	40-0042-01
Q9	Same as Q8			
Q10	TR, 2N3904	Motorola	2N3904	40-0041-01
Q11	TR, 2N3545	Fairchild	2N3545	40-0037-01
Q12	Same as Q8			
Q13	Same as Q10			
Q14	Same as Q11			
Q15	Same as Q8			
Q16	Same as Q10			
Q17	Same as Q11			
Q18	TR, 2N3568	Fairchild	2N3568	40-0032-01
Q19	Same as Q18			
Q20	Same as Q18			
R21	RFMF, 10kΩ, ±1%, 1/2W	IRC	CEC T-0 1001F	27-0060-01
R22	RFC, 220kΩ, ±10%, 1/4W	Allen-Bradley	CB2241	26-1536-01
R23	RFC, 10kΩ, ±10%, 1/4W	Allen-Bradley	CB1031	26-1594-01
R24	RFMF, 374kΩ, ±1%, 1/4W	IRC	CEC T-0 3743F	27-0220-01
R25	RFC, 100kΩ, ±10%, 1/4W	Allen-Bradley	CB1041	26-1525-01
R26	RFC, 47kΩ, ±10%, 1/4W	Allen-Bradley	CB4731	26-1524-01
R27	RFC, 27kΩ, ±10%, 1/4W	Allen-Bradley	CB2731	26-1529-01
R28	RVC, 50kΩ	CTS	UPE 200RE	29-0078-01
R29	Same as R25			
R30	RFMF, 18.2kΩ, ±1%, 1/2W	IRC	CEC T-0 1822F	27-0059-01
R31	RFC, 3.9kΩ, ±10%, 1/4W	Allen-Bradley	CB3921	26-1584-01
R32	RFMF, 191kΩ, ±1%, 1/2W	IRC	CEC T-0 1913F	27-0217-01
R33	Same as R25			
R34	RFC, 22MΩ, ±10%, 1/4W	Allen-Bradley	CB2261	26-1603-01
R35	Same as R23			
R36	Same as R25			
R37	Same as R34			
R38	Same as R22			
R39	Same as R26			
R40	RFMF, 392kΩ, ±1%, 1/2W	IRC	CEC T-0 3923F	27-0221-01
R41	Same as R27			
R42	Same as R28			

Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
R43	RFMF, 124kΩ, ±1%, 1/2W	IRC	CEC T-0 1243F	27-0215-01
R44	Same as R34			
R45	Same as R25			
R46	Same as R22			
R47	Same as R23			
R48	Same as R25			
R49	Same as R26			
R50	Same as R34			
R51	RFC, 12kΩ, ±10%, 1/4W	Allen-Bradley	CB1231	26-1532-01
R52	RFC, 4.7kΩ, ±10%, 1/4W	Allen-Bradley	CB4721	26-1531-01
R53	Same as R51			
R54	Same as R52			
R55	Same as R51			
R56	Same as R52			

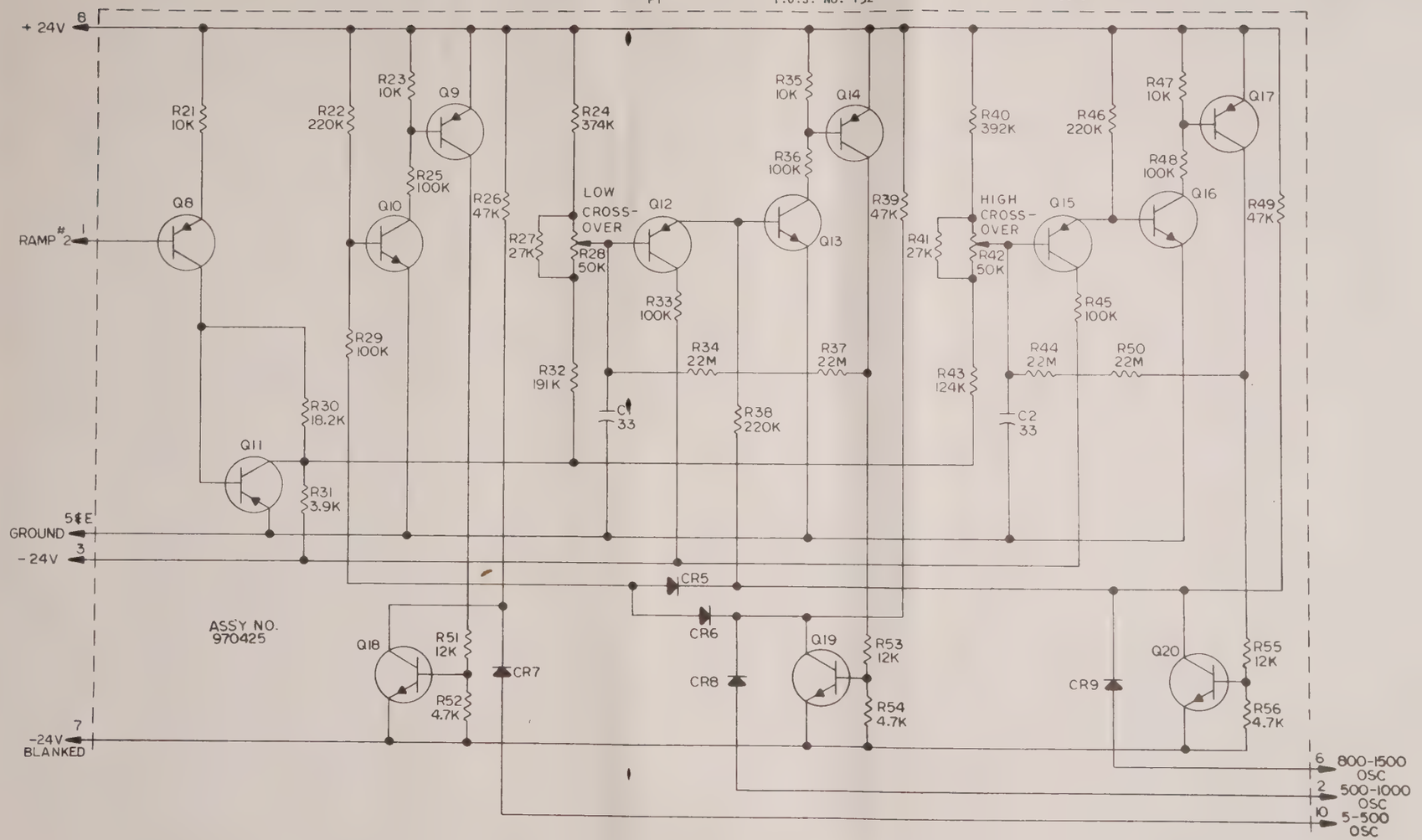

Figure 5-3. Drive Processing/Crossover Switch (Sheet 2) Figure 5-3

Electrical Parts List				
5-500 MHz Linearity (Assembly No. 970356)				
Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
CR1	DS, 1N4737A	Motorola	1N4737A	41-0094-01
Q1	TR, 40327	RCA	40327	40-0043-01
Q2	TR, 2N3904	Motorola	2N3904	40-0041-01
Q3	Same as Q1			
Q4	TR, 2N3906	Motorola	2N3906	40-0042-01
R1	RMF, 150kΩ, ±1%, 1/2W	IRC	Type CEC T-0	27-0216-01
R2	Same as R1			
R3	RVC, 10kΩ, 1/4W	CTS	Type 200	29-0079-01
R4	RMF, 51.1kΩ, ±1%, 1/2W	IRC	CEC T-0	27-0212-01
R5	RMF, 100kΩ, ±1%, 1/2W	IRC	Type CEC T-0	27-0122-01
R6	RMF, 4.75kΩ, ±1%, 1/2W	IRC	CEC T-0 4751K	27-0056-01
R7	RMF, 12.1kΩ, ±1%, 1/2W	IRC	Type CECT-0	27-0206-01
R8	Same as R3			
R9	Same as R5			
R10	Same as R6			
R11	RMF, 5.62kΩ, ±1%, 1/2W	IRC	Type CEC T-0	27-0203-01
R12	Same as R3			
R13	RMF, 10kΩ, ±1%, 1/2W	IRC	1001F	27-0060-01
R14	RMF, 13kΩ, ±1%, 1/2W	IRC	Type CECT-0	27-0207-01
R15	Same as R6			
R16	Same as R3			

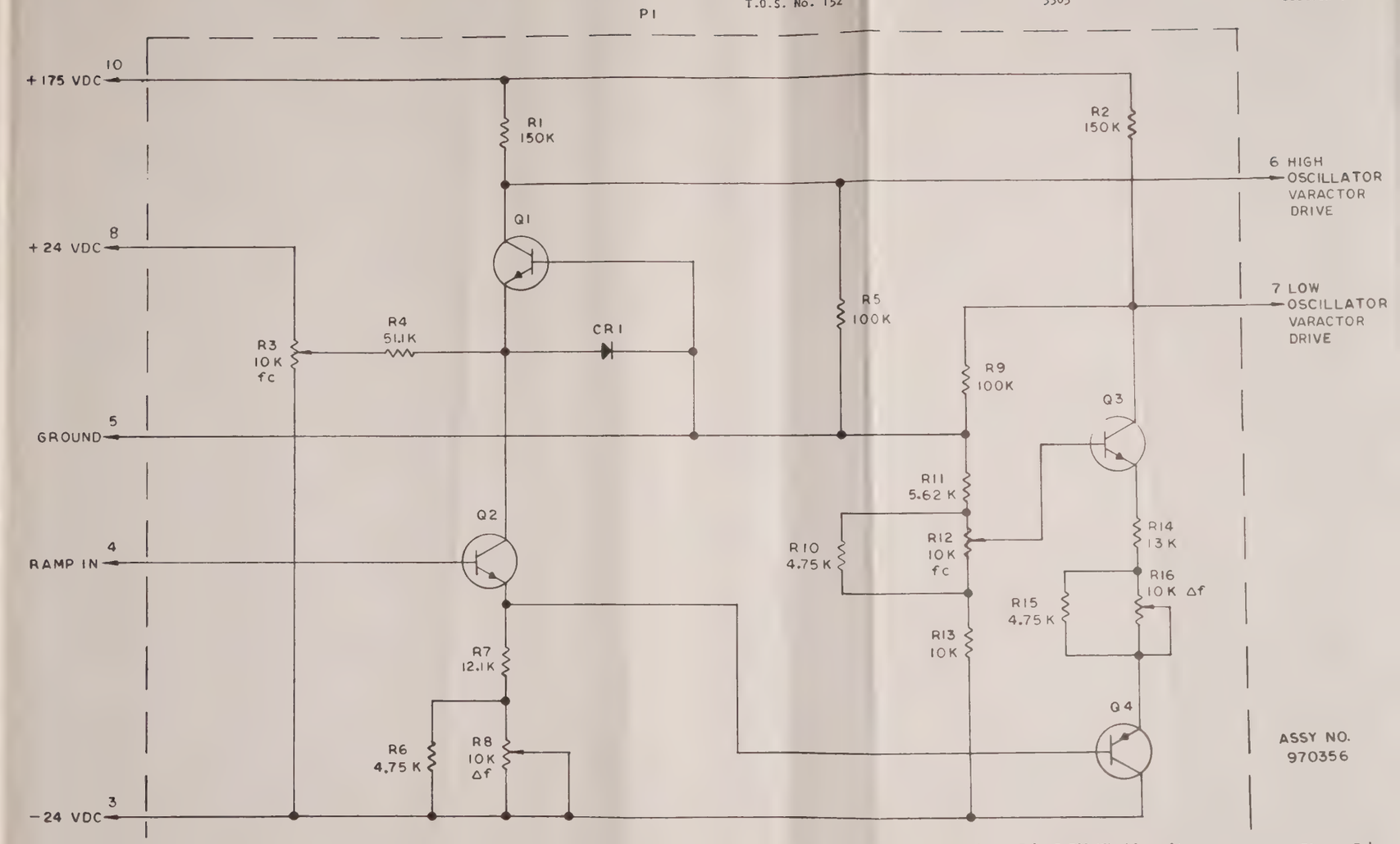

Figure 5-4. 5-500 MHz Linearity

TABLE 5-8.

Electrical Parts List

5-500 MHz Oscillator (Assembly No. 970567)

Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
C1	CFCF, 120pF, 500VDCW	Allen-Bradley	FA5C	21-0020-01
C2	CFD, 0.01μF, 50VDCW	Centralab	CK103	22-0062-01
C3	CFC, 220pF, 1000VDCW	Erie	831X	22-0123-01
C4	CFD, 5000pF, 1000VDCW	Aerovox	5506-0013	21-0041-01
C5	CFD, 3pF, 500VDCW	Aerovox	5501-0031	21-0005-01
C6	CFD, 1000pF, 1000VDCW	Aerovox	5506-0012	21-0040-01
C7	CFD, 7pF, 1000VDCW	Aerovox	5502-0034	21-0049-01
C8	CFD, 5pF, 500VDCW	Aerovox	5502-0033	21-0031-01
C9	Same as C8			
C10	Same as C8			
C11	CFD, 150pF, 500VDCW	Centralab	Type CE	22-0057-01
C12	Same as C11			
C13	Same as C1			
C14	Same as C11			
C15	Same as C11			
C16	Same as C1			
C17	Same as C11			
C18	Same as C6			
C19	CFCF, 1000pF, 500VDCW	Allen-Bradley	FA5C	21-0016-01
C20	Same as C1			
C21	CFD, 20pF, 1000VDCW	Aerovox	5504-0004	21-0038-01
C22	CFD, 10pF, 1000VDCW	Radio Material Corp	Type C	22-0001-06
C23	Same as C5			
C24	CFC, 1.2pF, 500VDCW	Quality Components	MC 1.2	22-0047-01
C25	Same as C21			
C26	CFD, 1pF, 1000VDCW	Aerovox		21-0051-01
C27	CFCF, 120pF, 1000VDCW	Aerovox	5506-0013	21-0046-01
C28	Same as C27			
C29	Same as C27			
C30	Same as C27			
C31	Same as C26			
CR1	DSV, 3.5pF	Motorola	MV1860D	41-0084-01
CR2	DS, Hot Carrier	Solitron		41-0104-01
CR3	Same as CR2			
CR4	Same as CR1			
J1	Receptacle Elect 50Ω	Amphenol	27-9	44-0078-01
J2	Same as J1			
L1	IF, 0.12μH	Jeffers	44-162K	32-0032-02
L2	IF, 0.03μH	Telonic		32-0039-05
L3	Same as L2			
L4	Same as L2			
L5	Same as L2			

Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
L6	IF, 2.2µH	Jeffers	4436-5K	32-0018-01
L7	IF, 0.47µH	Jeffers	4426-2K	32-0026-01
L8	Same as L7			
L9	IF, 0.04µH	Telonic		32-0039-03
L10	IF (SC)	Telonic		43-0016-01
L11	IF (SC)	Telonic		33-0093-01
L12	Same as L11			
L13	IF, 0.02µH	Telonic		32-0039-02
L14	IF (SC)	Telonic		33-0094-01
L15	Same as L10			
L16	Same as L7			
L17	Same as L7			
L18	IF, 0.035µH	Telonic		32-0039-07
L19	Same as L6			
L20	Same as L6			
Q1	TR, 2N4416	Union Carbide	2N4416	40-0063-01
Q2	TR, 2N5109	Telonic		40-0068-01
Q3	Same as Q2			
Q4	TR, MT1038	Fairchild	MT1038	40-0067-01
Q5	Same as Q4			
R1	RFC, 1kΩ, ±10%, 1/4W	Allen-Bradley	CB1021	26-1528-01
R2	RFC, 2.2kΩ, ±5%, 1/4W	Allen-Bradley	CB2215	26-1527-01
R3	RFC, 2.7kΩ, ±10%, 1/4W	Allen-Bradley	CB2721	26-0161-01
R4	RFC, 120Ω, ±10%, 1/4W	Allen-Bradley	CB1211	26-1597-01
R5	RFC, 27Ω, ±5%, 1/2W	Allen-Bradley	EB2705	26-0074-01
R6	RFC, 220kΩ, ±10%, 1/4W	Allen-Bradley	CB2231	26-1518-01
R7	RFC, 10kΩ, ±10%, 1/4W	Allen-Bradley	CB1031	26-1594-01
R8	RFC, 12kΩ, ±10%, 1/4W	Allen-Bradley	CB1231	26-1532-01
R9	RFC, 18Ω, ±10%, 1/4W	Allen-Bradley	CB1801	26-0158-01
R10	Same as R1			
R11	RFC, 470Ω, ±10%, 1/4W	Allen-Bradley	CB4711	26-1503-01
R12	RFC, 220Ω, ±10%, 1/4W			26-1501-01
R13	Not assigned			
R14	Not assigned			
R15	RFC, 4.7kΩ, ±10%, 1/4W	Allen-Bradley	CB4721	26-1531-01
R16	RFC, 1.2kΩ, ±10%, 1/4W	Allen-Bradley	CB1221	26-1593-01
R17	RFC, 180Ω, ±10%, 1/2W	Allen-Bradley	EB1811	26-0052-01
R18	Same as R4			
R19	Same as R17			
R20	Same as R15			
R21	RFC, 3.3kΩ, ±10%, 1/4W	Allen-Bradley	CB3321	26-1596-01
R22	RFC, 120kΩ, ±5%, 1/4W	Allen-Bradley	CB1245	26-1587-01
R23	Same as R22			

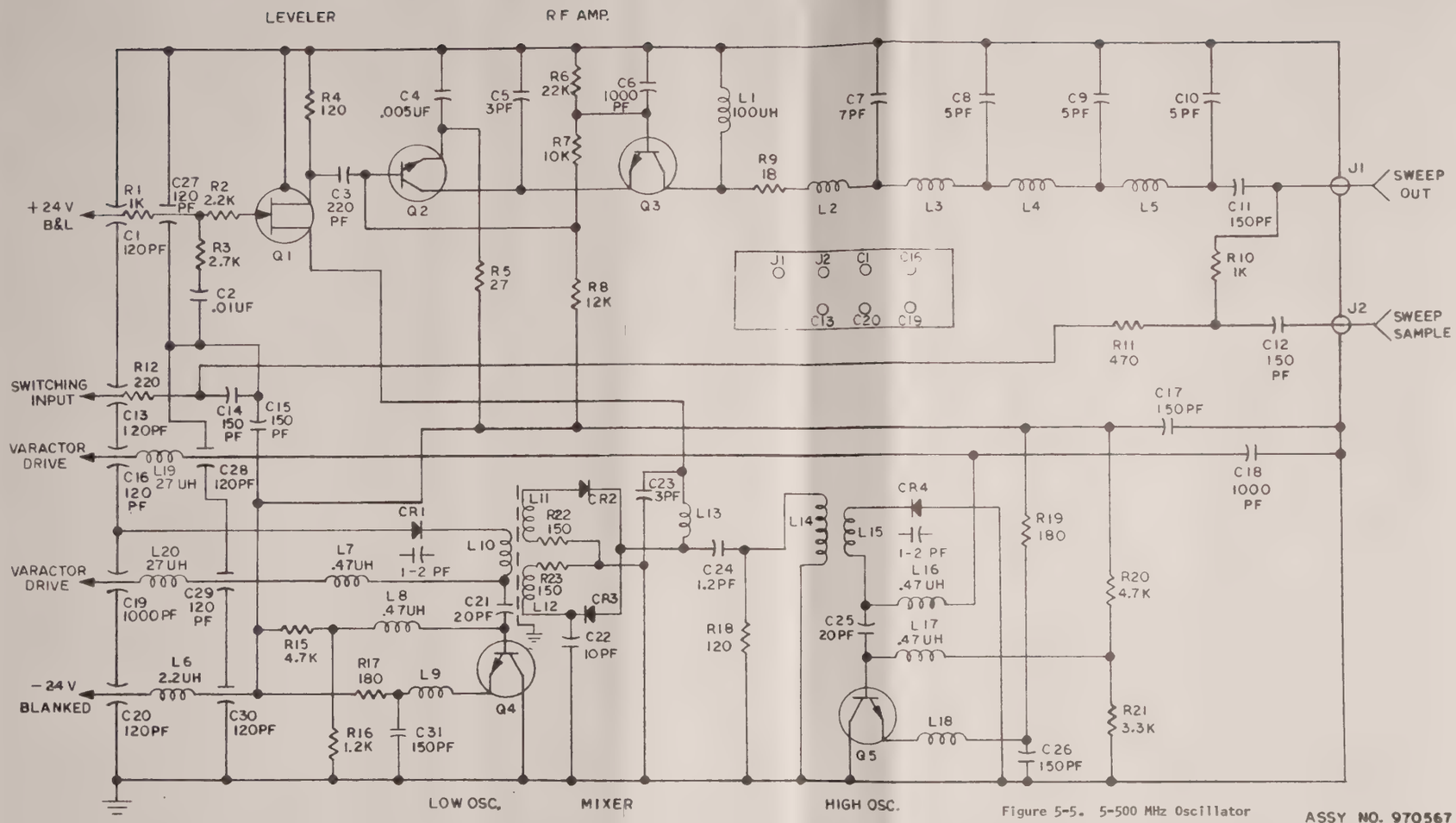

Figure 5-5. 5-500 MHz Oscillator ASSY NO. 970567

Electrical Parts List				
500-1000 MHz Linearity (Assembly No. 970314)				
Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
C1	CFD, 20 pF, 1000 VDCW	Radio Materials Corp	Type C	22-0001-08
CR1	DS, 1N459	Sylvania	1N459	41-0053-01
CR2	Same as CR1			
CR3	Same as CR1			
CR4	Same as CR1			
CR5	Same as CR1			
CR6	Same as CR1			
CR7	Same as CR1			
CR8	DS, 1N270	Sylvania	1N270	41-0061-01
Q1	TR, 40327	RCA	40327	40-0045-01
Q2	TR, 2N3904	Motorola	2N3904	40-0041-01
R1	RFMF, 6.49 kΩ, ±1%, 1/2W	IRC	CEC T-0 6491F	27-0237-01
R2	Same as R1			
R3	Same as R1			
R4	RFMF, 4.12 kΩ, ±1%, 1/2W	IRC	CEC T-0 4121F	27-0234-01
R5	RFMF, 1.5 kΩ, ±1%, 1/2W	IRC	CEC T-0 1501F	27-0230-01
R6	RFMF, 1.82 kΩ, ±1%, 1/2W	IRC	CEC T-0 1821F	27-0231-01
R7	RFMF, 1.21 kΩ, ±1%, 1/2W	IRC	CEC T-0 1211F	27-0086-01
R8	RFMF, 1.3 kΩ, ±1%, 1/2W	IRC	CEC T-0 1301F	27-0199-01
R9	RFMF, 332 Ω, ±1%, 1/2W	IRC	CEC T-0 3320F	27-0094-01
R10	RFMF, 12.1 kΩ, ±1%, 1/2W	IRC	CEC T-0 1211F	27-0206-01
R11	RFMF, 27.4 kΩ, ±1%, 1/2W	IRC	CEC T-0 2741F	27-0242-01
R12	Same as R10			
R13	RFMF, 100 kΩ, ±1%, 1/2W	IRC	CEC T-0 1223F	27-0122-01
R14	Same as R10			
R15	RFMF, 5.11 kΩ, ±1%, 1/2W	IRC	CEC T-0 5111F	27-0235-01
R16	RFMF, 2.21 kΩ, ±1%, 1/2W	IRC	CEC T-0 2211F	27-0200-01
R17	RVC, 10 kΩ, 20%, 1/4W	CTS	UPE 200RE	29-0079-01
R18	RFMF, 13.7 kΩ, ±1%, 1/2W	IRC	CEC T-0 1372F	27-0039-01
R19	RFMF, 681Ω, ±1%, 1/2W	IRC	CEC T-0 6810F	27-0229-01
R20	RFMF, 475Ω, ±1%, 1/2W	IRC	CEC T-0 4750F	27-0084-01
R21	RVC, 1 kΩ, 20%, 1/4W	CTS	UPE 200RE	29-0080-01
R22	RFMF, 2.55 kΩ, ±1%, 1/2W	IRC	CEC T-0 2551F	27-0233-01

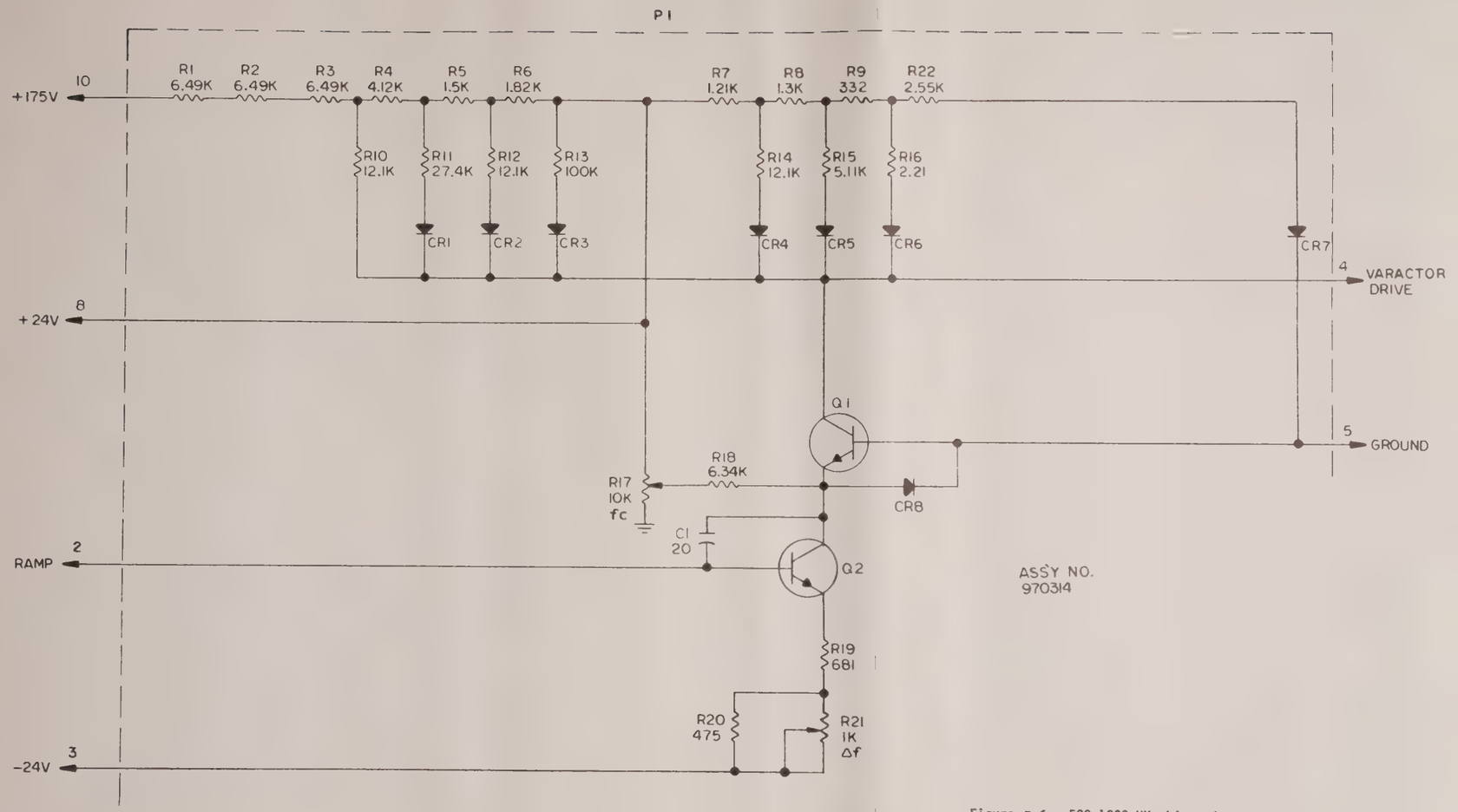

Figure 5-6. 500-1000 MHz Linearity

TABLE 5-10.

Electrical Parts List

500-1000 MHz Oscillator (Assembly No. 970350)

Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
C1	CFCF, 120 pF, 500 VDCW	Allen-Bradley	5A5C	21-0020-01
C2	Same as C1			
C3	Same as C1			
C4	Same as C1			
C5	CFCF, 120 pF, 500 VDCW	Allen-Bradley	FW5N	21-0046-01
C6	Same as C5			
C7	Same as C5			
C8	Same as C5			
C9	CFD, 100 pF	Aerovox	99DAX	21-0045-01
C10	CFD, 3 pF, 500 VDCW	Aerovox	99DAX	21-0005-01
C11	Same as C9			
C12	CFD, 75 pF	Aerovox	99DAX	21-0039-01
C13	CFD, 5 pF, 500 VDCW	Aerovox	99DAX	21-0031-01
C14	Same as C9			
C15	Same as C10			
C16	Same as C10			
C17	Same as C13			
C18	CFD, 150 pF, 500 VDCW	Centralab	Type CE	22-0057-01
C19	Same as C18			
C20	Same as C18			
C21	Same as C18			
C22	Same as C10			
C23	CFD, 1000 pF	Aerovox	99DAX	21-0040-01
C24	Same as C18			
C25	Same as C12			
C26	Same as C18			
C27	CFD, 20 pF	Aerovox	99DAX	21-0038-01
CR1	DS, 1N100	Sylvania	1N100	41-0032-01
CR2	DS, 1N5139	Motorola	1N5139	41-0069-01
CR3	Same as CR2			
CR4	Same as CR2			
J1	Receptacle, Elect	Amphenol	27-9	44-0078-01
J2	Same as J1			
L1	IF, 1 µH	Jeffers	4426-6K	32-0027-01
L2	IF, (SC)	Telonic		32-0039-01
L3	Same as L2			
L4	Same as L2			
L5	Same as L2			
L6	IF, 2.2 µH	Jeffers	4436-5K	32-0018-01
L7	IF, 0.68 µH	Jeffers	4426-4K	32-0017-01
L8	Same as L6			

Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
L9	Same as L6			
L10	IF, (SC)	Telonic		43-0068-01
L11	Same as L7			
L12	Same as L7			
L13	Same as L1			
L14	Same as L10			
L15	Same as L7			
Q1	TR, 2N4427	RCA	2N4427	40-0056-01
Q2	TR, TIXS10	Texas Instruments	TIXS10	40-0057-01
Q3	Same as Q2			
R1	RFC, 680Ω, ±5%, 1/4W	Allen-Bradley	CB6815	26-1578-01
R2	Same as R1			
R3	RFC, 150Ω, ±10%, 1W	Allen-Bradley	GB1511	28-0032-01
R4	RFC, 3,3 kΩ, ±5%, 1/4W	Allen-Bradley	CB3325	26-1562-01
R5	RFC, 4.7 kΩ, ±10%, 1/4W	Allen-Bradley	CB4721	26-1531-01
R6	RFC, 1 kΩ, ±10%, 1/4W	Allen-Bradley	CB1021	26-1528-01
R7	Same as R4			
R8	RFC, 220Ω, ±10%, 1/4W	Allen-Bradley	CB2211	26-1501-01
R9*	Subject to change			
R10	RFC, 47Ω, ±10%, 1/4W	Allen-Bradley	CB4701	26-1530-01
R11	Same as R10			
R12	Same as R9			
R13	Same as R9			
R14	Same as R6			
R15	RFC, 33Ω, ±5%, 1/4W	Allen-Bradley	CB3305	26-1573-01

* The value of this component is determined by gain level requirement.

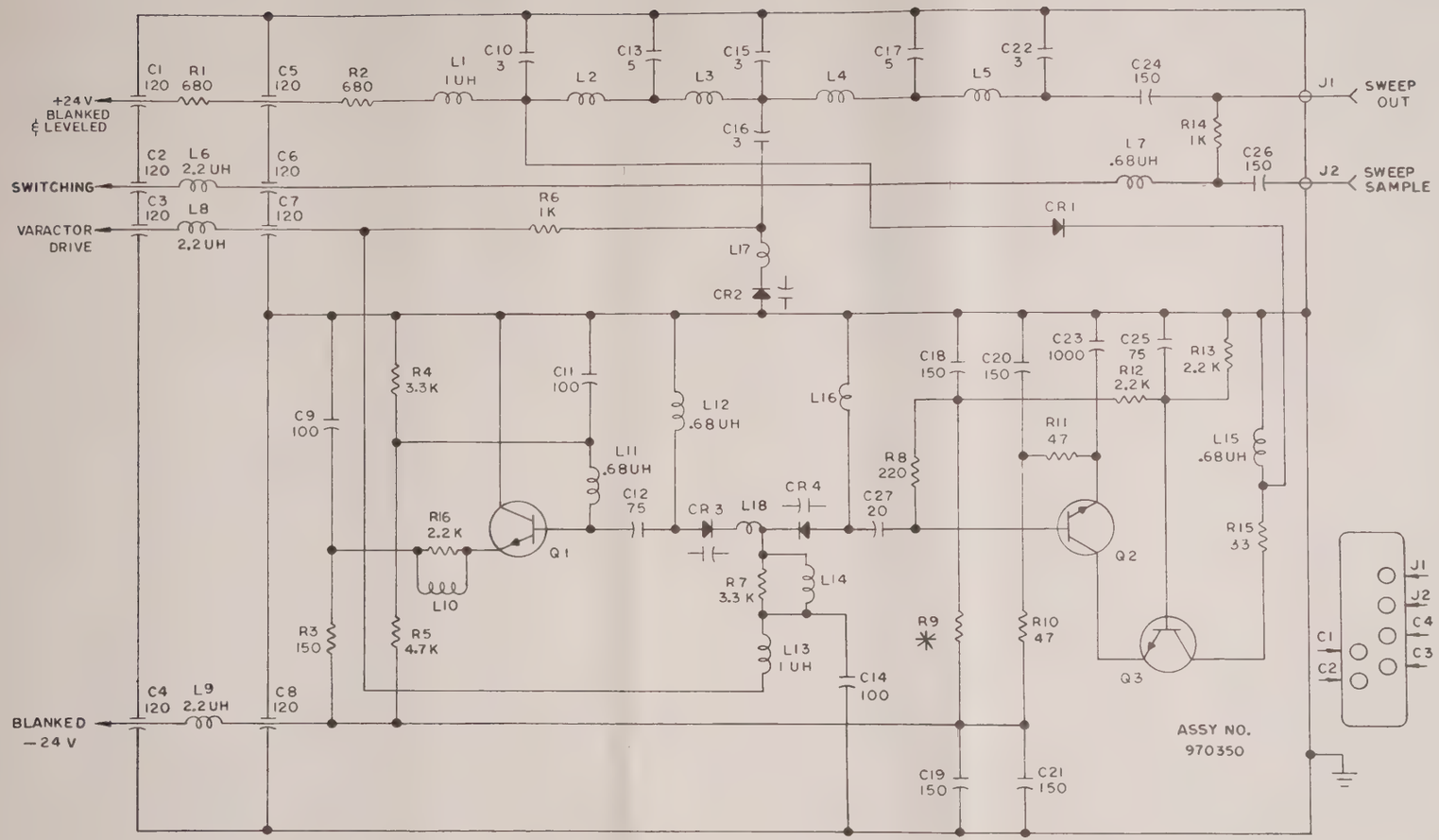

Figure 5-7. 500-1000 MHz Oscillator

TABLE 5-11.

Electrical Parts List

800-1500 MHz Linearity (Assembly No. 970313)

Circuit Ref	Description	Typical Manufacturer	Manufacturers Part No.	Telonic Part No.
C1	CFD, 20pF, 1000VDCW	Radio Materials Corp	Type C	22-0001-08
CR1	DS, 1N459	Sylvania	1N459	41-0053-01
CR2	Same as CR1			
CR3	Same as CR1			
CR4	Same as CR1			
CR5	Same as CR1			
CR6	Same as CR1			
CR7	Same as CR1			
CR8	Same as CR1			
CR9	Same as CR1			
CR10	Same as CR1			
CR11	Same as CR1			
CR12	Same as CR1			
CR13	Same as CR1			
CR14	DS, 1N270	Sylvania	1N270	41-0061-01
Q1	TR, 40327	RCA	40327	40-0004-01
Q2	TR, 2N3904	Motorola	2N3904	40-0041-01
R1	RFMF, 20 kΩ, ±1%, 1/2W	IRC	CEC T-0 6341F	27-0090-01
R2	RFMF, 13.7 kΩ, ±1%, 1/2W	IRC	CEC T-0 1371F	27-0240-01
R3	RFMF, 3.01 kΩ, ±1%, 1/2W	IRC	CEC T-0 3011F	27-0201-01
R4	RFMF, 5.11 kΩ, ±1%, 1/2W	IRC	CEC T-0 5111F	27-0235-01
R5	RFMF, 4.32 kΩ, ±1%, 1/2W	IRC	CEC T-0 432F	27-0202-01
R6	RFMF, 4.12 kΩ, ±1%, 1/2W	IRC	CEC T-0 4121F	27-0234-01
R7	RFMF, 249 kΩ, ±1%, 1/2W	IRC	CEC T-0 2490F	27-0226-01
R8	RFMF, 332Ω, ±1%, 1/2W	IRC	CEC T-0 3320F	27-0094-01
R9	Same as R8			
R10	RFMF, 475Ω, ±1%, 1/2W	IRC	CEC T-0 4750F	27-0084-01
R11	RFMF, 274Ω, ±1%, 1/2W	IRC	CEC T-0 3740F	27-0227-01
R12	RFMF, 221Ω, ±1%, 1/2W	IRC	CEC T-0 2210F	27-0225-01
R13	Same as R11			
R14	Same as R7			
R15	Same as R7			
R16	RFMF, 33.2 kΩ, ±1%, 1/2W	IRC	CEC T-0 3321F	27-0210-01
R17	RFMF, 15.8 kΩ, ±1%, 1/2W	IRC	CEC T-0 1581F	27-0241-01
R18	RFMF, 8.06 kΩ, ±1%, 1/2W	IRC	CEC T-0 8061F	27-0238-01
R19	Same as R18			
R20	RFMF, 30.1 kΩ, ±1%, 1/2W	IRC	CEC T-0 3011F	27-0246-01
R21	RFMF, 5.76 kΩ, ±1%, 1/2W	IRC	CEC T-0 5760F	27-0236-01
R22	Same as R21			
R23	Same as R3			
R24	RFMF, 13.7 kΩ, ±1%, 1/2W	IRC	CEC T-0 1371F	27-0239-01
R25	RFMF, 10 kΩ, ±1%, 1/2W	IRC	CEC T-0 1002F	27-0060-01

Circuit Ref	Description	Typical Manufacturer	Manufacturers Part No.	Telonic Part No.
R26	Same as R4			
R27	Same as R18			
R28	RFMF, 6.34 kΩ, ±1%, 1/2W	IRC	CEC T-0 6341F	27-0089-01
R29	RVC, 10 kΩ, ±20%, 1/4 W	CTS	Type VPE 200	29-0079-01
R30	Same as R10			
R31	Same as R8			
R32	RVC, 1 kΩ, ±20%, 1/4W	CTS	Type VPE 200	29-0080-01

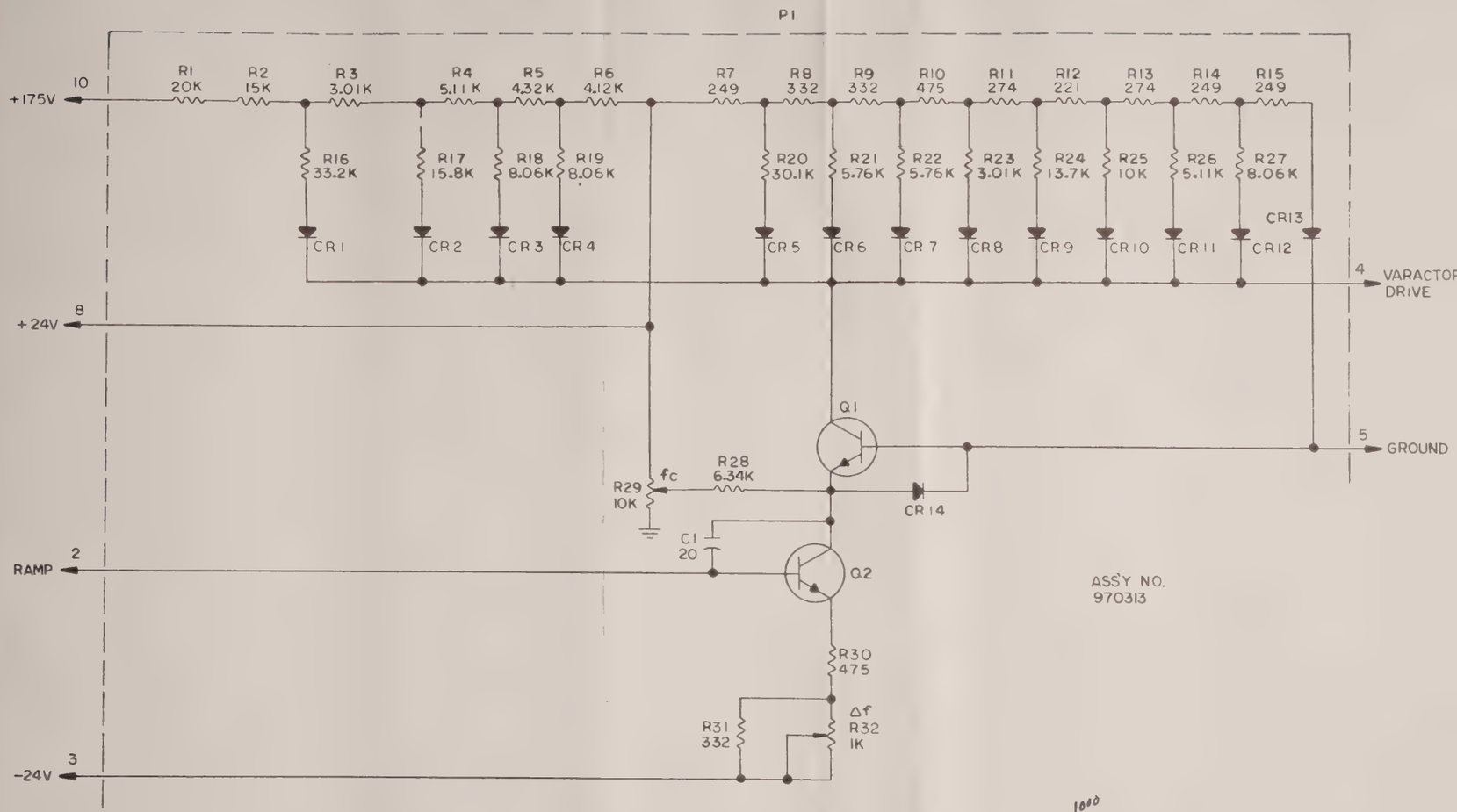

Figure 5-8. ~~800~~ 1000-1500MHz Linearity

TABLE 5-12.

Electrical Parts List

800-1500 MHz Oscillator (Assembly 970351)

Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
C1	CFCF, 120pF, 500VDCW	Allen-Bradley	5A5C	21-0020-01
C2	Same as C1			
C3	Same as C1			
C4	Same as C1			
C5	CFCF, 120pF	Allen-Bradley	FW5N	21-0046-01
C6	Same as C5			
C7	Same as C5			
C8	Same as C5			
C9	CFD, 100pF	Aerovox	99DAX	21-0045-01
C10	CFD, 2pF	Aerovox	99DAX	21-0044-01
C11	Same as C9			
C12	CFD, 20pF	Aerovox	99DAX	21-0038-01
C13	Same as C10			
C14	Same as C9			
C15	CFD, 1pF	Aerovox	99DAX	21-0047-01
C16	Same as C10			
C17	Same as C10			
C18	CFD, 150pF, 500VDCW	Centralab	Type CE	22-0057-01
C19	Same as C18			
C20	Same as C18			
C21	Same as C18			
C22	Same as C15			
C23	Same as C12			
C24	CFD, 1000pF	Aerovox	99DAX	21-0040-01
C25	Same as C12			
C26	CFD, 75pF	Aerovox	99DAX	21-0039-01
C27	Same as C18			
CR1	DS, 1N100	Sylvania	1N100	41-0032-01
CR2	DS, MV1860D	Motorola	MV1860D	41-0084-01
CR3	Same as CR2			
J1	Receptacle, Elect	Amphenol	27-9	44-0078-01
J2	Same as J1			
L1	IF, 1μH	Jeffers	4426-6K	32-0027-01
L2	IF, (SC)	Telonic		32-0039-01
L3	Same as L2			
L4	Same as L2			
L5	Same as L2			
L6	IF, 2.2μH	Jeffers	4436-5K	32-0018-01
L7	IF, 0.68μH	Jeffers	4426-4K	32-0017-01
L8	Same as L6			
L9	Same as L6			
L10	IF, (SC)	Telonic		43-0068-01

Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
L11	IF, (SC)	Telonic		43-0013-01
L12	Same as L1			
L13	Same as L10			
L14	Same as L11			
L15	IF, 0.33µH, ±10%	Jeffers	4416-7K	32-0032-07
L16	IF, (SC)	Telonic		32-0039-02
L17	Same as L6			
Q1	TR, TIXS40	Texas Instruments	TIXS40	40-0058-01
Q2	TR, 2N3835	Texas Instruments	2N3835	40-0057-01
Q3	Same as Q2			
R1	RFC, 680Ω, ±5%, 1/4W	Allen-Bradley	CB6815	26-1578-01
R2	Same as R1			
R3	RFC, 150Ω, ±10%, 1W	Allen-Bradley	GB1511	28-0032-01
R4	RFC, 3.3kΩ, ±5%, 1/4W	Allen-Bradley	CB3325	26-1562-01
R5	RFC, 4.7kΩ ±10%, 1/4W	Allen-Bradley	CB4721	26-1531-01
R6	RFC, 1kΩ, ±10%, 1/4W	Allen-Bradley	CB1021	26-1528-01
R7	Same as R6			
R8	Same as R4			
R9	RFC, 220Ω, ±10%, 1/4W	Allen-Bradley	CB2211	26-1501-01
R10*	Subject to change			
R11	RFC, 47Ω, ±10%, 1/4W	Allen-Bradley	CB4701	26-1530-01
R12	Same as R11			
R13	Same as R10			
R14	Same as R6			
R15	Same as R10			
R16	RFC, 33Ω, ±5%, 1/4W	Allen-Bradley	CB3305	26-1573-01

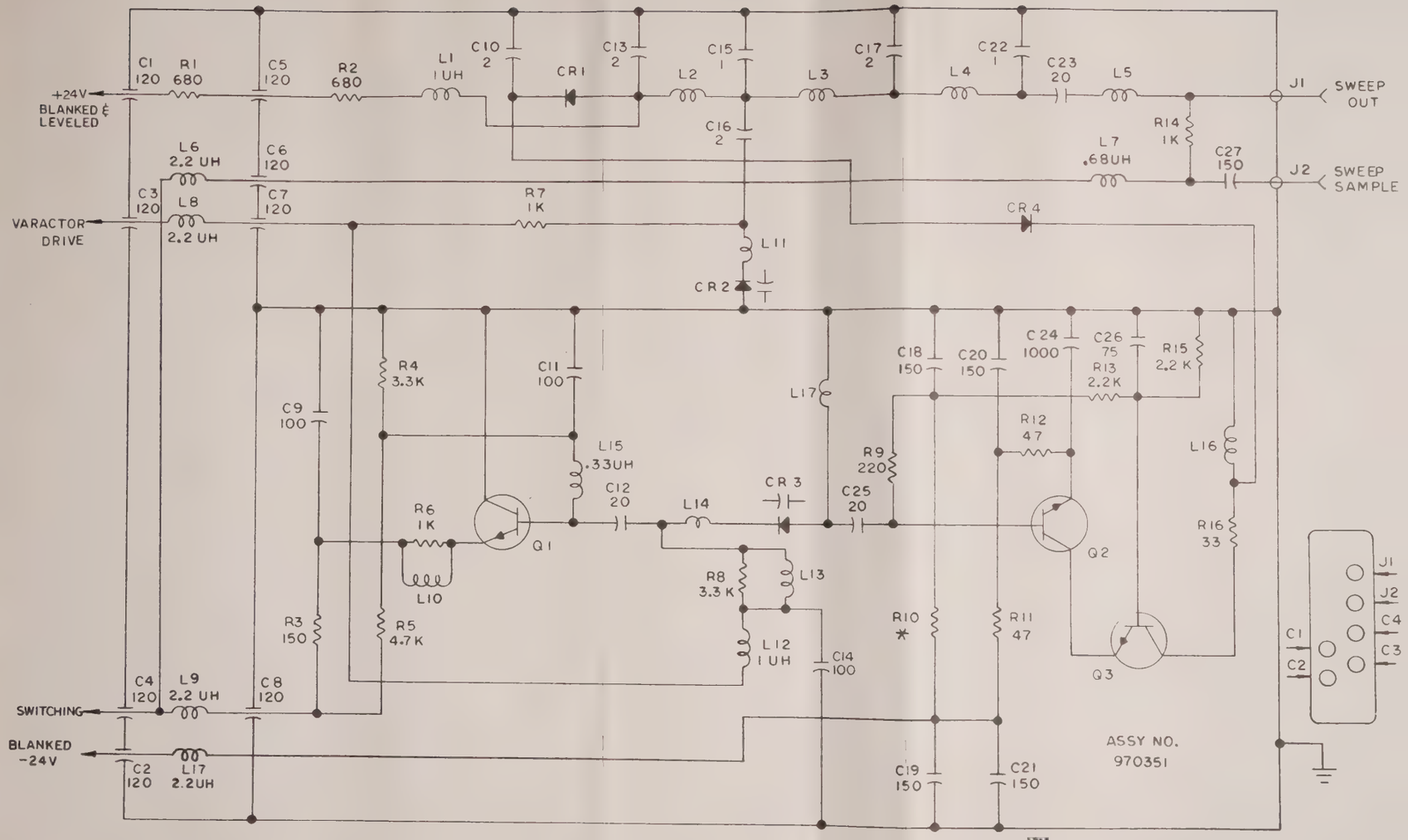

Figure 5-9. 800-1500MHz Oscillator

TABLE 5-13.

Electrical Parts List

RF Switch (Assembly No. 970418)

Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
C1	CFD, 1pF, 1000VDCW	Aerovox	5501-0005	21-0047-01
C2	CFD, 0.5pF, 1000VDCW	Aerovox	5501-0003	21-0048-01
C3	CFCF, 1000pF, 1000VDCW	Allen-Bradley	FU5N102W	21-0025-01
C4	CFC, 1.5pF, 500VDCW	Quality Components	Q.C. 1.5	22-0009-20
CR1	DS, 1N100	Sylvania	1N100	41-0032-01
CR2	DS, PS0605	Paramatric Ind.	PS0605	41-0085-01
CR3	Same as CR2			
P1	Connector, 50Ω	Amphenol	27-7	44-0183-01
P2	Same as P1			
P3	Same as P1			
P4	Receptacle, Elect	Dage	4961-1	44-0023-01
R1	RFC, 1.2kΩ, ±10%, 1/4W	Allen-Bradley	CB1221	26-1593-01

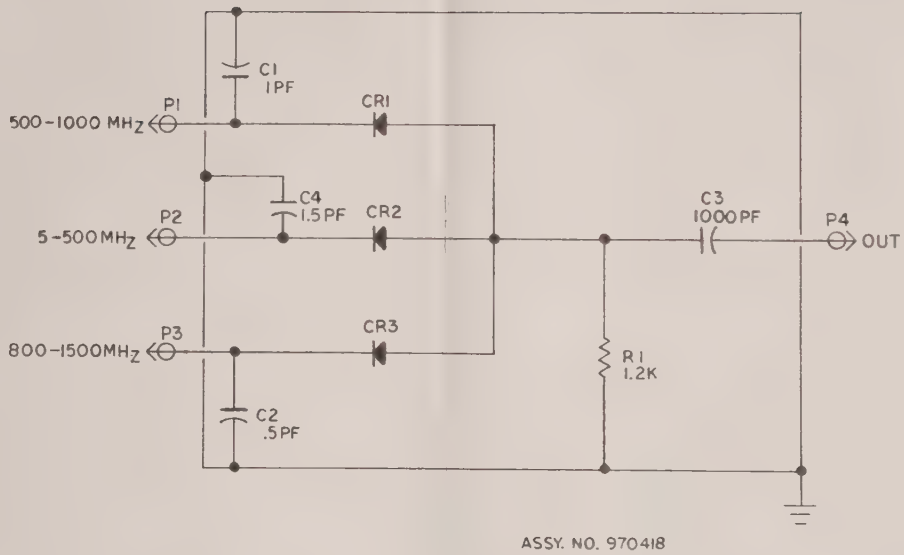

Figure 5-10. RF Switch Assembly

ADDENDUM SHEET
MODEL 3305 SWEEP OSCILLATOR PLUG-IN UNIT

The following changes shall be considered a part of this manual:

1. Page 4-17.

a. Replace the existing figure 4-14. with the enclosed figure.

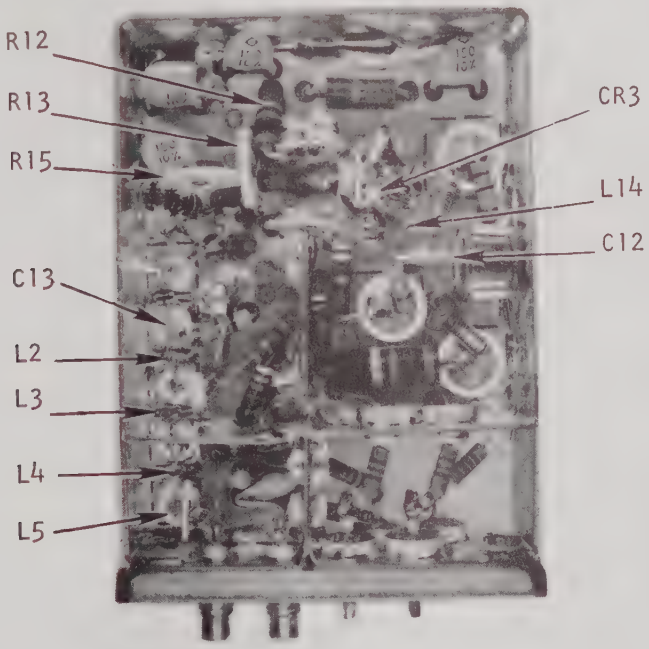

Figure 4-14. 800-1500 MHz Oscillator Module

b. Insert the following between steps p. and q.:

p1. Connect a voltmeter, set for 10VDC full scale, in parallel with resistor R12. (Decoupled at circuit end with 0.47µH choke)

p2. Connect a voltmeter, set for 10VDC full scale, from emitter to collector of transistor Q2. (Decoupled at circuit end with 0.47µH choke)

p3. Connect a voltmeter, set for 10VDC full scale, from emitter to collector of transistor Q3. (Decoupled at circuit end with 0.47µH choke)

p4. While observing the meters, adjust resistors R13 and R15 for maximum output displayed on the oscilloscope.

CAUTION

Ensure that the product of the reading of the voltmeter, connected in step p1., times the reading of either of the voltmeters connected in steps p2. and p3. does not exceed 30.0 (300mW dissipation)

2. TABLE 5-12. Change to read as follows:

C26	Same as C9			
R10	Not assigned			
R11	RFC, 220Ω, ±10%, 1/2W	Allen-Bradley	EB2211	26-0039-01
R12	RFC, 100Ω, ±10%, 1/2W	Allen-Bradley	EB1011	26-0015-01
R13	RVC, 10kΩ	Centralab	Type 600-1	29-0144-01
R15	Same as R13			
R16	RFC, 10Ω, ±5%, 1/8W	Allen-Bradley	CB1005	26-3007-01

3. Figure 5-9., 800-1500 MHz Oscillator Schematic Diagram

a. Change the following values:

C26 to 100
R11 to 220
R12 to 100
R13 to 10K
R15 to 10K

b. Change the schematic symbol for resistors R13 and R15 to the following:

c. Replace diode CR4 with a straight wire.

d. Remove resistor R10 and leave circuit open.

4. TABLE 5-13. Change to read as follows:

C4 Same as C1

5. Figure 5-10., RF Switch Assembly Schematic Diagram

Change the value of C4 to 1.

6. Page 4-16.

Replace the existing figure 4-13. with the enclosed figure.

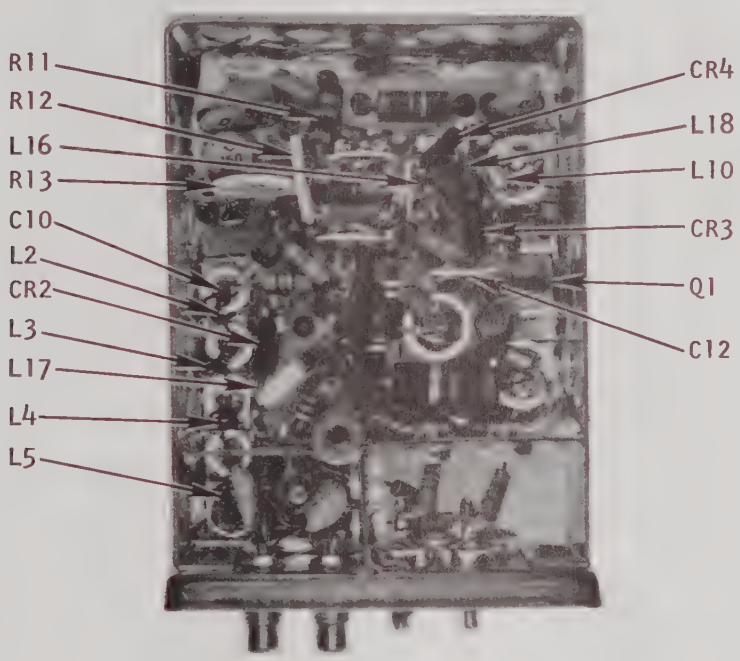

Figure 4-13. 500-1000 MHz Oscillator Module

7. Page 4-15.

a. Insert the following between steps p. and q.:

p1. Connect a voltmeter, set for 10VDC full scale, in parallel with resistor R11. (Decoupled at circuit end with 0.47µH choke)

p2. Connect a voltmeter, set for 10VDC full scale, from emitter to collector of transistor Q2. (Decoupled at circuit end with 0.47µH choke)

p3. Connect a voltmeter, set for 10VDC full scale, from emitter to collector of transistor Q3. (Decoupled at circuit end with 0.47µH choke)

p4. While observing the meters, adjust resistors R13 and R12 for maximum output displayed on the oscilloscope.

CAUTION

Ensure that the product of the reading of the voltmeter, connected in step p1., times the reading of either of the voltmeters connected in steps p2. and p3. does not exceed 30.0 (300mW dissipation)

8. TABLE 5-10. Change to read as follows:

R9	Not assigned			
R10	RFC, 150Ω, ±10%, 1/2W	Allen-Bradley	EB1511	26-0133-01
R11	RFC, 100Ω, ±10%, 1/2W	Allen-Bradley	EB1011	26-0015-01
R12	RVC, 10kΩ	Centralab	Type 600-1	29-0144-01
R13	Same as R12			
R15	RFC, 10Ω, ±5%, 1/8W	Allen-Bradley	CB1005	26-3007-01

9. Figure 5-7., 500-1000 MHz Oscillator Schematic Diagram

a. Change resistors listed below to the following ohmic values:

R10 to 150
R11 to 100
R12 to 10K
R13 to 10K

b. Change the schematic symbol for resistors R12 and R13 to the following:

c. Remove resistor R9 and leave the circuit open.

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